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Part II

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Coast Guard

Engineering Equipment; Design and Approval Requirements for Oil Pollution Prevention Equipment

DEPARTMENT OF TRANSPORTATION

Coast Guard

46 CFR Part 162

[CGD 76-088a]

Engineering Equipment; Design and Approval Requirements for Oil Pollution Prevention Equipment

AGENCY: Coast Guard, DOT.

ACTION: Final rules.

SUMMARY: These regulations set out specifications and procedures for approving oil-water separators, cargo monitors, bilge monitors, and bilge alarms for use on merchant vessels. The regulations are based upon international design and test specifications that have been recently adopted by the Inter-Governmental Maritime Consultative Organization. The purpose of the regulations is to provide standards for pollution prevention equipment that are representative of the best technology presently available. Additional regulations that require U.S. vessels, and foreign vessels calling at U.S. ports, to use approved pollution prevention equipment are currently being prepared in separate proceedings.

EFFECTIVE DATE: These amendments become effective on: October 10, 1979.

ADDRESSES: 1. As explained more fully below, comments on these rules may be submitted to Commandant (G-CMC/81), (CGD 76-088a), U.S. Coast Guard, Washington, D.C. 20590.

2. The Final Evaluation for these regulations, comments received on the regulations, and a copy of the U.S. Navy study referenced in the Discussion of Comments and Changes Made are available for examination and copying at the Marine Safety Council (G-CMC/81), Room 8117, Department of Transportation, Nassif Building, 400 Seventh Street, S.W., Washington, D.C. 20590.

FOR FURTHER INFORMATION CONTACT: Lieutenant Commander Steven McCall, Office of Merchant Marine Safety, (G-MMT-3/83), Room 8301, Department of Transportation, Nassif Building, 400 Seventh Street, S.W., Washington, D.C. 20590 (202 426-1444).

SUPPLEMENTARY INFORMATION: 1. On June 27, 1977, the Coast Guard published a notice of proposed rule making in the **Federal Register** for these regulations (42 FR 32686). Interested persons were requested to submit comments on the proposed regulations and twenty-eight comments were received.

2. The proposed regulations were published on the same day as two other sets of proposed pollution prevention regulations. The other two regulatory dockets are:

(a) CGD 75-124 Pollution Prevention—Vessel and Oil Transfer Facilities (33 CFR Parts 154, 155, and 156).

(b) CGD 76-088b Tank Vessels Carrying Oil in Bulk—Miscellaneous Rules Providing for Protection of the Marine Environment (33 CFR Part 157).

Docket number CGD 75-124 contains a requirement to use approved bilge alarms, bilge monitors, and oil-water separators when discharging oily mixtures overboard from a machinery space bilge or a fuel oil tank that carries ballast. (These requirements have since been transferred to docket number CGD 75-124a.) Docket number CGD 76-088b contains a requirement to use approved cargo monitors on most seagoing tank vessels. These requirements apply to U.S. vessels and to foreign vessels that call at U.S ports. Both dockets also prescribe dates on and after which approved equipment must be used (compliance dates). Some of the comments received on the proposed regulations address proposed requirements in CGD 75-124a and CGD 76-088b and are being analyzed with the comments received on those dockets.

3. The Coast Guard has proposed general approval procedures, production inspection and test procedures, and standards for accepting independent laboratories for testing certain equipment requiring Coast Guard approval. These proposed procedures were published in the **Federal Register** of October 23, 1978 (43 FR 49440-45). When these procedures are adopted as final rules, the procedures for approving separators, monitors, and alarms will be reviewed and modifications made, as appropriate, to eliminate any redundancies or inconsistencies.

4. The final rules contain various changes that have been made in response to comments on the proposed rules and on the basis of further analysis of the proposed rules within the Coast Guard. Commenters who recommended changes generally provided sufficient supporting rationale for the Coast Guard to reach informed decisions on whether the changes are needed and workable. Also, most of the changes made will not significantly increase the cost of equipment or approval testing, and they will ultimately increase, rather than reduce, the level of environmental protection afforded by the regulations. The only changes that have notable economic consequences are the additional test procedures in § 162.050-27(b)(12) and related sections that provide for taking and analyzing samples of the test mixture used in approval testing of monitors and alarms. As explained in the Final Evaluation, these additional procedures will increase the average maximum cost to approve a monitor or alarm from $5,000 to $7,000.

5. Although a public comment period has already been provided in this rule making, an additional opportunity for comment, principally on the changes made, is nevertheless desirable to assure that the rules as revised represent workable and reasonable procedures and requirements. Accordingly, persons wishing to comment may do so by submitting comments to the address listed in the ADDRESSES section of this preamble. Commenters should include their names and addresses, identify the docket number of rule making (CGD 76-088a) and give reasons for the comments. Comments should be submitted before November 12, 1979, in order to receive timely consideration. Based upon comments received, the regulations may be further revised or additional regulations may be issued.

6. The submissions of several commenters on the proposed regulations are extensive in scope and provide detailed recommendations. As a result, it has not been possible to discuss in detail all of the comments received. Comments that have not been specifically addressed generally fall into one of the following categories:

(a) Comments that resulted in minor revisions or clarifications to the final rules.

(b) Comments that were not relevant to the proposed regulations.

(c) Comments that apply to CGD 75-124a or CGD 76-088b and that are being analyzed with comments received on those dockets.

(d) Comments making recommendations that, if adopted, would result in overregulation. (For example, some commenters recommended that certain commonly accepted lab practices be adopted as regulation where in fact regulations are not needed to ensure that the practices will be followed. Others recommended clarifications to particular regulations that are considered to be sufficiently clear as originally proposed. Some commenters also recommended changes without providing supporting reasons, and no sound reasons could otherwise be established for making the changes.)

7. Several commenters asked questions concerning the meaning of specific provisions of the proposed regulations and concerning courses of

action that would be acceptable under the regulations. For the most part, these questions can be answered by referring to other sections of the regulations. For example, one commenter recommended that the second sentence in proposed § 162.050–27(n)(1) be revised by adding the words "allowed to warm up for the period of time prescribed in the monitor's instructions manual" after the word "started". As revised, the sentence would have read, "After one week the monitor is started, allowed to warm up for the period of time prescribed in the monitor's instructions manual, zeroed, and calibrated." The additional words are unnecessary. Section 162.050–27(b)(10) of both the proposed and final rules includes the same procedure recommended by the commenter. (Section 162.050–27(b)(10) provides that "[i]n each test the monitor must be operated in accordance with the procedures described in its instructions manual".)

8. The subject matter of the regulations is both detailed and lengthy and has necessitated extensive use of the technical language to describe the various specifications and testing procedures. However, every attempt has been made to draft each provision in clear and concise language and to minimize the complexity of its technical content. Nevertheless, if readers of the final regulations find that certain regulations are still unclear, they may address questions concerning them to Lieutenant Commander Steven McCall, whose address is listed above. It a significant number of inquiries are received, clarifications will be provided in subsequent rule making.

9. The Coast Guard has consulted with the Environmental Protection Agency on the revisions made in § 162.050–39 and with respect to other determinations made in this rule making. Specific instances of consultation with EPA are referenced in the Discussion of Comments and Changes Made.

Final Evaluation

1. These regulations are considered to be "nonsignificant" and, accordingly, a final evaluation has been prepared and placed in the public docket as required by the Regulatory Policies and Procedures of the Department of Transportation (44 FR 11040–11045). The DOT Order requires that each evaluation include an economic analysis which quantifies, to the extent practicable, the estimated cost of the regulations to the private sector, consumers, and Federal, State and local governments, as well as the anticipated benefits and impact of the regulations.

2. As explained in the Final Evaluation, it is estimated that approximately sixty devices will be approved at an average maximum cost per approval of $7000. Total industry costs to obtain approvals are expected to be approximately $440,000. The impact of administering the approval program will be absorbed with existing Coast Guard resources. The approval program will provide for the availability of pollution prevention equipment that has been developed using the best technology presently available. The ultimate benefits and impact of the program will be a substantial reduction in oil pollution damage to the marine environment and a reduction in economic losses resulting from pollution damage.

3. The expected costs to purchase and install approved equipment on vessels within the timetables prescribed in CGD 75–124a and CGD 76–088b will be summarized in those projects when they are published as final rules. The specification provides for approval of equipment in different sizes and capabilities and, as a result, the exact costs will depend principally upon the type of equipment selected for vessel use.

Drafting Information

The principal persons involved in drafting these regulations are: Lowell F. Martin, Office of Merchant Marine Safety, and William R. Register, Office of the Chief Counsel.

Background Information

1. In November 1973, the International Conference on Marine Pollution convened by the Intergovernmental Maritime Consultative Organization (IMCO) adopted the International Convention for the Prevention of Pollution from Ships, 1973. In February 1978, the Convention was incorporated into and modified by the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (hereinafter MARPOL Protocol). The Protocol was submitted on January 19, 1979, to the U.S. Senate for its advice and consent to ratification. Annex I to the MARPOL Protocol sets forth several requirements applicable to vessels including requirements concerning the use of oil-water separators, oil content monitors, and oil content alarms on vessels when discharging oily mixtures from cargo tanks, cargo pumproom bilges, machinery space bilges, and fuel oil tanks that carry ballast. Regulations 15 and 16 of the Annex require that each oil-water separator, monitor, and alarm used on a vessel be of a design approved by the government of the State under whose authority the vessel is operating.

2. To assist governments in developing the necessary approval requirements, the IMCO Marine Environment Protection Committee (MEPC) formed a working group to develop model design and testing specifications for the equipment. The Coast Guard actively participated in these deliberations. In May 1976, this working group completed drafting the specifications and they were subsequently adopted by the IMCO Assembly in 1977 as recommended international design and testing specifications. The specifications are in the IMCO Resolution A.393(X), and they form the basis for the design and testing specifications in these final rules.

3. Current Coast Guard regulations in §§ 155.400, 157.37, and 157.39 of Title 33, Code of Federal Regulations, provide for the use of Coast Guard approved pollution prevention equipment. The regulations in this document contain the procedures for obtaining Coast Guard approval of the equipment and the design and testing specifications applicable to the equipment. As explained under SUPPLEMENTARY INFORMATION, the Coast Guard is preparing regulations in CGD 75–124a and CGD 76–088b which require the use of approved separators, monitors, and bilge alarms on and after the compliance dates prescribed in those rules.

4. The technology pertaining to shipboard oil-water separation and to monitoring of overboard discharges of oily mixtures is in a state of continuing development. Accordingly, technological advancements occurring after adoption of the design and testing specifications in these final rules will be reviewed on an ongoing basis to determine the need for revisions to the specifications.

Description of the Regulations

1. Sections 162.050–1, 162.050–3, and 162.050–4 contain introductory provisions which define the scope of the regulations, explain the meaning of terms used in specific provisions, and list documents incorporated by reference into the regulations.

2. Section 162.050–5 lists the information that must be contained in an application for approval of an item of equipment. Paragraph 162.050–5(b) provides that an application may reference information contained in a previously submitted application so that excess paperwork can be avoided.

3. Section 162.050–7 describes the procedures for obtaining approval of pollution prevention equipment. Paragraphs 162.050–7 (b) and (c) of these

procedures describes the initial processing of an application. Essentially, when an application is received, it is examined to determine whether the item described in the application complies with the design requirements in these final rules and to determine what probability the item has of passing the approval tests. Paragraphs 162.050–7 (d) through (g) prescribe the procedures for submitting an item for testing, conducting the tests, submitting test reports, and issuing approval certificates. Paragraphs (h), (i), (j), and (k) of § 162.050–7 contain the approval criteria for each item of equipment.

The approval criterion in paragraph 162.050–7(h) for a 15 p.p.m. oil-water separator adopts the IMCO standard which prescribes a concentration limit of 15 parts per million (p.p.m.) of oil in water for overboard discharges through a 15 p.p.m. separator that has an alarm to indicate when this concentration is exceeded. This standard is contained in Annex I to the MARPOL Protocol.

4. Section 162.050–9 prescribes the contents of the test report to be submitted by a designated testing facility after completion of approval testing. The test report is evaluated with the application to determine whether the equipment should be approved.

5. Section 162.050–11 requires that approved equipment be plainly marked with certain descriptive information and information concerning its use. This information is necessary as an aid in proper selection and use of separators, monitors, and bilge alarms on vessels.

6. Section 162.050–13 contains provisions concerning factory production and inspection of approved equipment. The principal purposes for conducting an inspection will be to determine whether the manufacturing procedures described in an application for approval are being followed and whether equipment built under Coast Guard approval meets the design specifications in these regulations.

7. Section 162.050–14 contains requirements for sample collection and preservation during approval testing. One liter samples must be collected, preserved with hydrochloric acid, and refrigerated until analyzed.

8. Section 162.050–15 contains procedures for obtaining designation as a facility authorized to perform approval tests. The procedures allow designated facilities to use their own test rigs, if previously approved by the Coast Guard, or to use a test rig of the manufacturer for whom approval testing is being performed.

9. Sections 162.050–17 and 162.050–19 contain requirements for test rigs used in approval testing. These sections include diagrams of typical test rigs that can be used.

10. Sections 162.050–21, 162.050–25, 162.050–29, and 162.050–33 contain design requirements for oil-water separators, cargo monitors, bilge monitors, and bilge alarms. The requirements are based upon those contained in the IMCO specifications. They also incorporate the applicable safety requirements in the Coast Guard Marine and Electrical Engineering Regulations published in Subchapters F and J of Title 46, Code of Federal Regulations. The requirements in §§ 162.050–25(j) and 162.050–29(d) for each cargo monitor and each bilge monitor to have a recording device are also contained in Annex I to the MARPOL Protocol.

11. Section 162.050–23 contains approval tests for separators. The tests assess the performance capability of a separator using both low and high concentrations of oil in the influent to the separator as well as with a pure oil influent. The tests also evaluate performance when influent suction is lost and when the separator is operated for an extended period in the automatic mode.

12. Section 162.050–27 contains approval tests for cargo monitors. The tests assess the performance capability of a cargo monitor using a variety of crude oils or refined products, or both, depending upon which oils the monitor is designed to use. The tests also determine cargo monitor response time and assess performance under variable operating conditions and after an extended shutdown period.

13. Section 162.050–31 contains approval tests for bilge monitors. These tests are similar to the tests for cargo monitors, except that the oils specified for separator tests are used in lieu of the cargo oils specified for cargo monitor tests. Section 162.050–31 contains, in addition, tests that assess the capability of the devices required by paragraphs 162.050–29(c)(1) and (c)(2) to produce the signals prescribed by those paragraphs.

14. Section 162.050–35 contains approval tests for bilge alarms. These tests assess the capability of an alarm to actuate at an oil concentration of 15 parts per million of oil in water under variable operating conditions. The tests also determine the alarm's response time and its capability to operate properly after an extended shutdown period.

15. Section 162.050–37 requires that a vibration test be conducted for each monitor and bilge alarm and each separator control component submitted for approval. This test must be performed for an applicant by an independent laboratory. A laboratory report describing the results of the testing must be submitted with the application for approval.

16. Section 162.050–39 prescribes the method for measuring oil content of samples taken during approval testing. The method consists of solvent extraction and infrared spectrophotometry. Carbon tetrachloride, Freon, or other fluorocarbon solvent may be used as the solvent in the extraction process, except that carbon tetrachloride must be used with samples taken during testing of a cargo monitor.

Discussion of Comments and Changes Made

The following paragraphs contain an analysis of comments received on the notice of proposed rule making and an explanation of changes made in the final rules.

Section 162.050–3(a). Five commenters questioned whether the term "parts per million" (p.p.m.) as defined in § 162.050–3(a) is a volume to volume ratio or a weight to volume ratio of oil in water. "Parts per million" typically means a volume to volume ratio and this is what was intended in the proposal. Section 162.050–3(a) has been revised in the final rules to emphasize this intent.

Section 162.050–3(d), (e), and (f). Three commenters recommended that definitions of "cargo monitor", "bilge monitor", and "bilge alarm" be added to explain more fully what equipment will be approved under these specifications. Definitions have been added as new §§ 162.050–3(d), (e), and (f).

Section 162.050–3(g). A definition of "independent laboratory" has been added as a new § 162.050–3(g). Sections 162.050–21(b), 162.050–25(c), and 162.050–37(a) in both the proposed and final rules contain provisions requiring the use of "independent laboratories" in approving components of equipment to be installed in an explosive atmosphere and in conducting vibration testing of a monitor or bilge alarm or of the controls on a separator. The purpose of the definition is to explain what type of laboratory is considered to be "independent" and capable of performing the tests and approvals described in §§ 162.050–21(b), 162.050–25(c), and 162.050–37(a). Though comments were not received concerning the meaning of "independent laboratory", the definition will more fully explain the term.

Sections 162.050–7(h)(3). One commenter stated that the approval criterion in § 162.050–7(h)(3) is too stringent because a separator cannot continually produce a 15 p.p.m. effluent

under true operating conditions. He recommended that the criterion be changed to require that each sample, when analyzed, have an oil content of less than 50 p.p.m. and to require that at least 90% of the samples have an oil content of less than 15 p.p.m. The purpose of the 15 p.p.m. approval criterion in § 162.050–7(h)(3) is to minimize as much as possible the number of instances in which a separator will fail to operate properly after it is installed on a vessel. Though the criterion is rigorous, it represents an international consensus on what constitutes a reasonable and practicable test standard, and its use should assure availability of the best technology presently available. Also, use of the criterion suggested by the commenter would necessitate taking a substantial number of samples at each flow condition and oil content specified in the approval tests in order for the results to be meaningful. The increased number of samples to be collected and analyzed would significantly increase the cost of approval. Accordingly, § 162.050–7(h)(3) has not been changed in the final rules.

As previously explained, the approval criterion in § 162.050–7(h)(3) has the effect of setting a standard of 15 parts per million of oil in water for overboard discharges through a 15 p.p.m. separator. Regulations of the Environmental Protection Agency in §§ 110.3 and 110.4 of Part 110, Title 40, Code of Federal Regulations, essentially prohibit the discharge of oil into the navigable waters and contiguous zone if the discharge would (1) violate applicable water quality standards or (2) create a sludge or emulsion or produce visible traces of oil in or on the surface of water or along adjoining shorelines. Discharges of 15 p.p.m. or less normally do not exceed this criteria. Accordingly, vessels which are equipped with approved separators that are in proper operating condition should normally be in compliance with these regulations. The possibility of noncompliance with §§ 110.3 and 110.4 when using Coast Guard approved separators is the subject of continuing discussion with EPA. The results of this discussion will be summarized in CGD 75–124a and CGD 76–088b when the regulations in those projects are published as Final Rules.

Section 162.050–11(b)(7). One commenter noted that the requirement in proposed § 162.050–11(b)(7) to list each restriction on the use of substances that could impair operation of approved equipment could result in a volumious listing. Section 162.050–11(b)(7) has been revised to require a listing of bilge cleaners, solvents, and other chemical compounds that do not impair operation of the equipment.

Section 162.050–11(b)(9). The Coast Guard has determined, though not in response to any particular comment, that the part numbers of the filter or coalescer elements of a separator should be marked on the equipment. Numerous items of shipboard equipment have replacable filter elements and the marking is necessary as an aid in proper selection of elements to be used in a separator. Accordingly, a new § 162.050–11(b)(9) has been added to require that the marking on a separator list the part numbers of its filter or coalescer elements.

Section 162.050–14. One commenter recommended that sample bottles used in approval testing be required to have caps that will not absorb oil fractions and that will not leak plasticizers of a type that would appear in an infrared spectrum. In accordance with this recommendation, a requirement that the cap be lined with a material that will not affect the oil content of a sample has been added to the final rules in § 162.050–14(a).

The requirements contained in §§ 162.050–23(a)(8) and 162.050–39(d) of the proposed regulations have been transferred to § 162.050–14 of the final rules.

Sections 162.050–14(b) and (c). One commenter recommended that samples taken during approval testing be acidified at the time of collection. A second commenter recommended that each sample be refrigerated or that both acid and solvent be added to each sample at the time of collection. The U.S. Environmental Protection Agency Handbook entitled "Methods For Chemical Analysis of Water and Wastes" (EPA–625/6–74–003) recommends that samples be acidified at the time of collection and that they also be refrigerated at or below 4°C until the sample is analyzed. The commenters' recommendations, as modified by the EPA recommendation, have been adopted in §§ 162.050–14(b) and (c) of the final rules.

Sections 162.050–15(b)(3)(iv) and 162.050–5(a)(11). Proposed § 162.050–15(b)(3)(iv) required that each request for designation as a facility authorized to perform approval testing include information describing each test rig to be used. Three commenters recommended that approval testing be allowed using the test rig of an applicant-manufacturer in lieu of a test rig belonging to the facility. If a manufacturer's test rig is available, its use will, in most instances, be the most economical method for conducting approval testing. Accordingly, §§ 162.050–5(a)(11) and 162.050–15(b)(3)(iv) have been revised to allow use of a manufacturer's test rig.

Sections 162.050–15(d), (e), and (f) and 162.050–39. Several commenters made recommendations for improving the procedures in § 162.050–39 for measuring the oil content of samples taken during approval testing. The Coast Guard adopted most of these recommendations in the final rules and an explanation is provided in subsequent paragraphs. However, based upon the concern in these comments for accuracy in sample analysis, the Coast Guard has determined that additional procedures are needed to verify whether a testing facility has the capability to perform sample analysis accurately. Accordingly, additional procedures have been added to the final rules at paragraphs (d), (e), and (f) of § 162.050–15. (Section 162.050–15 contains procedures for obtaining designation as a facility authorized to conduct approval tests.) The additional provisions require a prospective facility to analyze a set of twelve oil-in-water samples provided by the Coast Guard. The analysis must be conducted in accordance with the procedures in § 162.050–39 for measuring oil content of samples, and the results of the analysis must be submitted to the Coast Guard. The results of analysis will in turn be analyzed to determine the accuracy of the facility's procedures for analyzing samples.

Section 162.050–15(f) prescribes the degree of accuracy required of a facility in analyzing samples. The analysis methods incorporated by reference into § 162.050–15(f) were developed by independent experts in the field of statistical analysis and are readily available to the public. These methods are contained in the following documents:

(a) "Standard Practice For Determination of Precision and Bias of Methods of Committee D–19 on Water, D 2777–77", American Society for Testing and Materials (ASTM).

(b) "Experimental Statistics", National Bureau of Standards Handbook No. 91 (October 1966).

The selection of significance levels used in these methods is based upon a study entitled "Determining the Concentration of Oil in Water Samples by Infrared Spectrophotometry", Phase II, Volume I (Report NSRDC 4536). This study was conducted by the U.S. Navy and a copy of the study is available for public inspection at the location listed under ADDRESSES. Section 162.050–15(f)(2) provides for discarding one measurement under circumstances prescribed in that section. The purposes

for discarding the measurement is to account for the possibility that a sample provided by the Coast Guard may deteriorate in shipment or be improperly prepared for shipment.

Figures 162.050–17(a) and 162.050–19. One commenter asked whether the test rig diagrams described in Figures 162.050–17(a) and 162.050–19 are rigid design specifications or whether they are descriptions of typical test rigs to be used in approval testing. Another commenter asked whether the monitor and bilge alarm test rig, as shown in Figure 162.050–19, is intended for use only with full flow monitors and alarms. The diagrams show typical test rigs and are not intended to be rigid design specifications. For example, substitutions of another valve arrangement that performs the same function will be acceptable. The monitor and alarm test rig shown in Figure 162.050–19 is suitable for use in testing both full flow and bypass flow monitors and alarms. Sections 162.050–17 and 162.050–19 have been clarified in the final rules by listing in those sections the specific requirements applicable to test rigs and by emphasizing that the associated figures depict typical test rigs.

Three commenters noted that the air cocks needed for Tests No. 1S, No. 2S, and No. 3S were not shown on the separator test rig diagram in Figure 162.050–17(a). This omission has been corrected in the final rules.

Sections 162.050–17(b) and 162.050–23(a)(4). Five comments were received concerning the provisions in proposed §§ 162.050–17(b) and 162.050–23(a)(4) that relate to mixture pumps used on separator test rigs. The recommendations included the following:

(a) Specify the size distribution of oil droplets in the pump discharge.

(b) Require a separator manufacturer to specify the supply pump for shipboard use with his separator and require use of that pump for approval testing in lieu of the mixture pump on the test rig.

(c) Modify the Reynolds Number and flow velocity criteria.

(d) Require heating of influent mixtures.

The purpose for using mixture pumps is to impose conditions that represent actual shipboard conditions. The additional provisions recommended by the commenters are not necessary to simulate shipboard conditions; and, accordingly, they have not been adopted in the final rules. The provisions for mixture pumps in proposed § 162.050–23(a)(4) have been transferred to § 162.050–17(b) in the final rules.

Section 162.050–19(c), Figure 162.050–19, and § 162.050–27(b)(11). One commenter recommended that the centrifugal pump shown in Figure 162.050–19 be used for approval testing of monitors and alarms in all cases whether or not the equipment under test has its own pump. Another commenter suggested that the centrifugal pump be operated at a speed of 1,000 revolutions per minute or more during testing to provide a reasonably homogeneous mixture for use during testing. These test conditions are representative of shipboard conditions and have been adopted in §§ 162.050–19(c) and 162.050–27(b)(11) of the final rules.

Sections 162.050–21(a), 162.050–23(f), 162.050–27(n), 162.050–31(l), and 162.050–35(i). Two commenters noted that the proposed regulations did not contain a test to verify compliance with § 162.050–21(a). This section requires that a separator be designed to operate in each plane that forms an angle of 22.5° with the plane of its normal operating position. The Coast Guard has modified § 162.050–23(f) to require that a separator be inclined at an angle of 22.5° during the final hour of Test No. 5S. This additional test procedure is sufficient to show compliance with § 162.050–21(a). Similar changes have been made in Tests No. 12CM, No. 10BM, and No. 7A in §§ 162.050–27(n), 162.050–31(l), and 162.050–35(i).

Section 162.050–21(a). One commenter recommended that § 162.050–21(a) be revised to require that each separator be designed to operate under shipboard conditions of 22.5° roll and 10° pitch. Another commenter recommended a 10° roll and a 5° pitch. The rationale for these recommendations was that designing a separator to operate in all planes up to 22.5° from its normal operating position was both difficult and expensive. These comments have not been adopted. The IMCO resolution requires the 22.5° angle for both roll and pitch. The purpose of the requirement is to determine the extent of a separator's capability to operate properly under relatively severe conditions regardless of the postion in which the equipment is installed on the vessel.

Sections 162.050–21(d) and 162.050–25(f). Sections 162.050–21(d) and 162.050–25(f) require that approved equipment be designed in accordance with the applicable requirements in Subchapters F and J of Title 46, Code of Federal Regulations. One commenter asked that the applicable regulations be specified. A determination of what regulations apply will have to be made on a case by case basis. The determination is dependent upon the physical characteristics of the components in a particular piece of equipment. Prospective applicants, if they are not sure which regulations apply to their equipment, can obtain assistance by contacting the Coast Guard and providing a detailed set of plans and an equipment list for the components of their equipment.

Sections 162.050–21(h) and 162.050–23, Figure 162.050–17(a), and 162.050–3(b) and (c). One commenter questioned whether an oily mixture fed as influent into a separator could be diluted with sea water to assist in reducing the oil concentration in the mixture to a level that could be lawfully discharged overboard. A separator that relies on diluting an influent mixture to perform its function properly will not be approved under thes regulations. The function of a separator is to separate and remove oil from an overboard discharge, not to dilute it. Before diluting type devices could be approved, specifications and tests would have to be developed that would include provisions for limiting the total permissible amount of oil that could be discharged overboard through the device within a given period. Maximum discharge limits have already been prescribed for overboard discharges of oil through cargo monitors (see 33 CFR 157.37(a)(4)). However, to prescribe discharge limits for diluting type devices to be used in lieu of separators would necessitate a lengthy, complex proceeding to formulate appropriate limits. The proceeding would have to take into account various considerations such as vessel size, type, and area of vessel operation, and types of machinery used on board vessels. Such a proceeding is not currently contemplated because of the expected availability of separators.

Figure 162.050–17(a) in both the proposed and final regulations shows a test rig and separator arrangement that does not contain an additional water pipe for use in diluting the influent to the separator. Also, the approval tests for separators in § 162.050–23, as drafted, do not contain tests for devices that use sea water to dilute influent mixtures. However, to prevent confusion in interpreting the regulations, additional rules have been added to explain clearly that a separator which relies on dilution of influent mixtures to perform its function will not be approved. Accordingly, the definitions of "100 p.p.m. separator" and "15 p.p.m. separator" in §§ 162.050–3 (b) and (c) have been clarified to emphasize that separators are equipment designed to remove oil from an oil-water mixture.

Also, a new paragraph 162.050–21(h) has been added to emphasize that a separator must be designed so that it does not rely on dilution of influent mixtures, in whole or part, as a means to perform its function.

Section 162.050–23. Two commenters recommended that § 162.050–23 be revised to allow approval of separators that have been designed for use with only certain weights of oil. Machinery space bilges contain varying mixtures of both heavy and light oils. If a limited use separator were installed, the bilge monitor or alarm could actuate frequently when varying mixtures of oil were encountered. Multi-purpose separators are necessary to avoid frequent monitor or alarm actuation. Accordingly, the recommendation has not been adopted.

One commenter requested that the final rules include a procedure for sampling separated oil effluent from a separator. Since separated oil cannot be lawfully discharged overboard there is no environmental purpose for the requirement.

Section 162.050–23(a)(11). One commenter recommended that maintenance be prohibited during approval testing of separators. This recommendation has been adopted. Section 162.050–21(e) requires that separators installed in unattended machinery spaces be designed for 24 hours of unattended operation, and this capability can be sufficiently verified by requiring that a separator be able to pass approval testing without having to be serviced during or between any of the individual tests. Accordingly, a new § 162.050–23(a)(11) has been added to prohibit maintenance (including replacement of parts) during and between approval tests. Currently available equipment should have little difficulty in complying with this prohibition.

Section 162.050–23(b). Three commenters recommended that a test of the reliability of filter and coalescer elements in separators be added to Test No. 1S in § 162.050–23(b). The prohibition against maintenance in § 162.050–23(a)(11) will require elements to have sufficient capability to perform their function without replacement during or between any of the approval tests. Thus, the no maintenance prohibition has the effect of providing a minimum reliability criterion for filter and coalescer elements.

Another commenter recommended that filter and coalescer elements be tested using 100 parts per million of particulate contaminant in the influent. Use of a contaminant in the influent as a check on reliability of elements is not necessary. The presence of contaminant in the influent, though it may slightly shorten the effective life of an element, would tend to enhance the oil separation process rather than detract from it.

Sections 162.050–23(d) through (g). Two commenters stated that performing Test No. 3S with light distillate fuel oil between two series of steps that call for using a heavy residual oil could foul the test rig with the light or heavy oil and prevent reliable results in sample analysis. The commenters also recommended that the step calling for light oil be placed first in the testing sequence. The use of light oil between steps that call for heavy oil does pose a potential for fouling the test rig and, accordingly, the final rules have been modified to avoid mixing of oils. However, the recommendation that the light oil step be first in the testing sequence has not been adopted. IMCO Resolution A.393(X) requires that a heavy oil be used first since this order of testing provides for a more rigorous testing procedure. Accordingly, proposed Test No. 3S has been moved to the end of the separator test sequence and redesignated as Test No. 6S in the final rules. Proposed Tests No. 4S, No. 5S, and No. 6S have been redesignated as Tests No. 3S, No. 4S, and No. 5S, respectively in the final rules.

Section 162.050–23(f). One commenter recommended that Test No. 5S in § 162.050–23(f) be revised to allow the oil content of influent to be held constant at a concentration of 25% oil in water for fifteen minutes followed by a fifteen minute interval with pure water influent. Variable concentrations of influent are used in this test in order to simulate shipboard conditions. Accordingly, the recommendation has not been adopted.

Section 162.050–25. One commenter recommended that § 162.050–25 be amended to require that a cargo monitor be capable of measuring oil content in all concentrations between 0 and 1200 p.p.m. Test No. 5CM is conducted with a 500 p.p.m. mixture and in effect defines the minimum concentration range as 0–500 p.p.m. A determination of whether a cargo monitor should be designed to read greater concentrations has been left to the discretion of the equipment manufacturer. Whatever range is selected, Tests Nos. 1CM, 2CM, and 4CM check for operation of the monitor at various concentrations throughout that range. Accordingly, the commenter's suggestion has not been adopted.

Section 162.050–25(b). One commenter requested that the requirement in § 162.050–25(b) for a cargo monitor to have an automatic means of calibration be deleted from the final rules. He reasoned that manual calibration can be accomplished rapidly and therefore should be accepted as equivalent to automatic calibration. Though manual calibration can be accomplished rapidly, it can also introduce errors in a monitor's accuracy during actual operation and, thus, could result in discharges of oil in excess of allowable limits. Accordingly, the commenter's suggestion has not been adopted.

Sections 162.050–25(j) and 162.050–29(d). One commenter asked whether recording the date and time of overboard discharges could be done manually in lieu of using the recording devices required by §§ 162.050–25(j) and 162.050–29(d). As mentioned earlier in this preamble, Annex I of the MARPOL Protocol contains a requirement for monitors to have these recording devices.

Accordingly, §§ 162.050–25(j) and 162.050–29(d) have been retained in the final regulations so that approved monitors will also comply with the requirements of the PROTOCOL when it enters into force.

Sections 162.050–27(b)(12), 162.050–31(b)(1), 162.050–35(b)(3), 162.050–39(a), 162.050–7(i), 162.050–7(j), and 162.050–7(k). Several commenters stated that mixing a known quantity of oil with a known quantity of water might not always be an effective method of measuring the concentration of a mixture used in monitor and alarm testing since oil could easily plate out on the test rig piping before reaching the inlet to the monitor or alarm. The commenters recommended that the monitor and alarm tests in §§ 162.050–27, 162.050–31, and 162.050–35 be revised to require that a sample of the test mixture be taken each time a monitor reading is recorded and each time the bilge alarm actuates, and that the oil content of each sample be determined following the procedures in § 162.050–39. These recommendations have been adopted in the final rules and appropriate revisions have been made in §§ 162.050–7(i), 162.050–7(j), 162.050–162.050–7(k), 162.050–27(b)(12), 162.050–31(b)(1), 162.050–35(b)(3), and 162.050–39(a). Analyzing the oil content of samples of the test mixture, as opposed to determining the oil content of the mixture by premixing known quantities of oil and water, is a more accurate test method. It is also important to note that if samples of the test mixture were not taken, and if a significant amount of plating out were to occur, the oil content values determined by premixing could be significantly greater than the values

actually measured by the monitor or alarm. Thus, the device could easily fail testing even though it was, in fact, a perfectly acceptable device.

One commenter suggested the use of Teflon coated piping in the test rig as a possible means of avoiding plating out of oil. Although there is no prohibition against the use of Teflon coated piping, some amount of plating out may still occur in this type of piping.

Section 162.050–27(c). One commenter recommended that the calibration check points specified in Test No. 1CM of § 162.050–27(c) be changed to 0, 25%, 50%, 75%, and 100% of the scale of oil concentrations measured by the cargo monitor. His reasoning was that the increments between check points in Test No. 1CM are too small to have meaning on a 0–6000 p.p.m. cargo monitor or other large scale monitor. A cargo monitor must be accurate throughout its entire scale because its readings are combined with measurements of overboard discharge flow rate and vessel speed to determine the liters of oil discharged per nautical mile of vessel travel. (The liters of oil discharged per nautical mile are limited to sixty liters or less by § 157.37(a)(3) of Title 33, Code of Federal Regulations.) The calibration check points proposed by the commenter are too widely spaced to be a sufficient check on cargo monitor accuracy; and, accordingly, the commenter's recommendation has not been adopted in the final rules.

Sections 162.050–27(d), 162.050–27(g), 162.050–31(g). One commenter suggested that Tests No. 2CM, No. 5CM, and No. 5BM in §§ 162.050–27(d), 162.050–27(g), and 162.050–31(g) be run last to avoid fouling the test rig with the various oils and contaminants used in those tests. Since the total quantity of oil and contaminants used in these tests is small, the possibility of test rig fouling is minimal and reversing the order of the tests would result in a less rigorous test procedure. Accordingly, the commenter's suggestion has not been adopted.

Sections 162.050–27(e)(1), and (f)(1) and 162.050–31(e)(1) and (f)(1). Three commenters objected to proposed § 162.050–27(e)(1), which included a provision for recording the time of turning on the metering pump in Test No. 3CM. The basis for the objection was that the time interval between turning the pump on and first detecting oil depends upon the length of test rig piping between the metering pump on the rig and the monitor under test. This length is determined by the configuration of the test rig. If the test rig piping is too long, the time interval will exceed 20 seconds and the monitor will not be able to meet the approval criteria in §§ 162.050–7(i)(3) and 162.050–7(i)(4) even though, in fact, it may be a perfectly acceptable device. Accordingly, the procedural step of recording the time of turning on the metering pump results in an unreasonable approval requirement and the step has been deleted from Test No. 3CM. Similar deletions have been made in Tests No. 4CM, No. 3BM, and No. 4BM of §§ 162.050–27(f)(1) and 162.050–31(e)(1) and (f)(1)..

Sections 162.050–25(g), 162.050–29(b), and 162.050–33(b). Four commenters said that the 20 second response time requirements in §§ 162.050–25(g), 162.050–29(b), and 162.050–33(b) are impractical. Several instruments are available that can meet these requirements. The purpose of the requirements is to allow sufficient time for actuation of valves in a vessel's piping system so that none of the oily mixture causing actuation of the monitor or alarm is discharged overboard. Accordingly, these requirements have been retained in the final rules.

Table 162.050–27(g). One commenter recommended that the particulate contaminant specified in Table 162.050–27(g) be wetted with oil rather than water during the cargo monitor tests. Coast Guard experience with these tests has shown that controlled introduction of the contaminant is more readily accomplished if it is wetted with water. Accordingly, the commenter's recommendation has not been adopted in the final rules.

Section 162.050–35. One commenter noted that the proposed test procedures for bilge alarms did not contain a test to verify compliance with the 20 second response time requirement in § 162.050–33(b). The IMCO Resolution contains a performance test, and it has been added to § 162.050–35(d) of the final rules as a new Test No. 2A. Proposed tests No. 2A, No. 3A, No. 4A, No. 5A, and No. 6A have been redesignated as Tests No. 3A, No. 4A, No. 5A, No. 6A, and No. 7A respectively in the final rules.

Sections 162.050–37(b). One commenter requested that the requirement in § 162.050–37(b) to conduct vibration testing at the resonant frequency of the equipment be deleted because no one would operate equipment at its resonant frequency. If the Coast Guard were to approve equipment for a vessel on the condition that it not be operated at its resonant frequency, then a vibration survey of the vessel would be necessary to ensure that vibration at the resonant frequency of the equipment would not occur. This survey would be unduly expensive and burdensome for vessel operators. Accordingly, the commenter's suggestion has not been adopted in the final rules.

Section 162.050–39. One commenter recommended that the extraction solvent specified in proposed § 162.050–39 be changed from carbon tetrachloride to a fluorocarbon solvent. The difference in results between a fluorocarbon solvent and carbon tetrachloride is insignificant in the range of 10 p.p.m. to 100 p.p.m. Accordingly, § 162.050–39(d)(3) of the final rules allows use of Freon 113, Ucon 113, Genetron 113 (or equivalent fluorocarbon solvent), or carbon tetrachloride in analysis of samples obtained in approval testing of separators, bilge monitors, and bilge alarms. Cargo monitors, however, must accurately determine oil content at concentrations of up to 500 p.p.m., and higher if the equipment is designed to measure higher concentrations. Therefore, the requirement to use carbon tetrachloride as the extraction solvent in analysis of samples obtained in cargo monitor testing has been retained.

One commenter recommended that the extraction solvent be petroleum ether. This recommendation has not been adopted due to the flammability hazard of petroleum ether.

Section 162.050–39(f). One commenter proposed that § 162.050–39(f) be revised to require four extractions instead of the two extractions specified in the proposal. Another commenter proposed three extractions. Increasing the number of extractions may increase the amount of oil recovered; however, it also increases the probability of experimental error which can mask the benefit of increased oil recovery. Since the proposed method with two extractions has been agreed to internationally in IMCO Resolution A.393(X), it is retained in the final regulations.

In accordance with the foregoing, Part 162 of Title 46, Code of Federal Regulations, is amended by adding a new Subpart 162.050 to read as follows:

Subpart 162.050—Pollution Prevention Equipment

Sec.

162.050–1 Scope.
162.050–3 Definitions.
162.050–4 Documents incorporated by reference.
162.050–5 Contents of application.
162.050–7 Approval procedures.
162.050–9 Test report.
162.050–11 Marking.
162.050–13 Factory production and inspection.
162.050–14 Sample collection and preservation.
162.050–15 Designation of facilities.

Sec.

162.050–17 Separator test rig.
162.050–19 Monitor and bilge alarm test rig.
162.050–21 Separator: design specification.
162.050–23 Separator: approval tests.
162.050–25 Cargo monitor: design specification.
162.050–27 Cargo monitor: approval tests.
162.050–29 Bilge monitor: design specification.
162.050–31 Bilge monitor: approval tests.
162.050–33 Bilge alarm: design specification.
162.050–35 Bilge alarm: approval tests.
162.050–37 Vibration test.
162.050–39 Measurement of oil content.

Authority: This subpart is issued under the authority of 33 U.S.C. 1321(j), 46 U.S.C. 391a, 49 U.S.C. 1655(b)(1), and 49 CFR 1.4(b) and 1.46.

Subpart 162.050—Pollution Prevention Equipment

§ 162.050–1 Scope.

(a) This subpart contains—

(1) Procedures for approval of 100 p.p.m. separators, 15 p.p.m. separators, cargo monitors, bilge monitors, and bilge alarms;

(2) Design specifications for this equipment;

(3) Tests required for approval;

(4) Procedures for obtaining designation as a facility authorized to conduct approval tests;

(5) Marking requirements; and

(6) Factory inspection procedures.

§ 162.050–3 Definitions.

(a) "p.p.m." means parts per million by volume of oil in water;

(b) "100 p.p.m. separator" means a separator that is designed to remove enough oil from an oil-water mixture to provide a resulting mixture that has an oil concentration of 100 p.p.m. or less;

(c) "15 p.p.m. separator" means a separator that is designed to remove enough oil from an oil-water mixture to provide a resulting mixture that has an oil concentration of 15 p.p.m. or less;

(d) "Cargo monitor" means an instrument that is designed to measure and record the oil content of cargo residues from cargo tanks and oily mixtures combined with these residues;

(e) "Bilge monitor" means an instrument that is designed to measure and record the oil content of oily mixtures from machinery space bilges and fuel oil tanks that carry ballast;

(f) "Bilge alarm" means an instrument that is designed to measure the oil content of oily mixtures from machinery space bilges and fuel oil tanks that carry ballast and activate an alarm at a set concentration limit; and

(g) "Independent laboratory" means a laboratory that—

(1) Has the equipment and procedures necessary to approve the electrical components described in §§ 162.050–21(b) and 162.050–25(c), or to conduct the test described in § 162.050–37(a); and

(2) Is not owned or controlled by a manufacturer, supplier, or vendor of separators, monitors, or bilge alarms.

§ 162.050–4 Documents incorporated by reference.

(a) The following documents are incorporated by reference into this subpart:

(1) Underwriters Laboratories Standard 913 (as revised April 8, 1976).

(2) "Experimental Statistics", National Bureau of Standards Handbook No. 91 (October 1966).

(3) "Standard Practice for Determination of Precision and Bias of Methods of Committee D–19 on Water, D–2777–77", American Society for Testing and Materials.

(b) The documents listed in this section may be obtained as follows:

(1) The UL standard may be obtained from Underwriters Laboratories, Inc., Publications Stock, 333 Pfingsten Road, Northbrook, Illinois 60062.

(2) The ASTM standard may be obtained from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103.

(3) The NBS handbook may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

(c) The documents listed in this section are also on file in the **Federal Register** library.

(d) Approval to incorporate by reference the materials listed in this section was obtained from the Director of the **Federal Register** on August 21, 1979.

§ 162.050–5 Contents of application.

(a) An application for approval of a 15 p.p.m. or 100 p.p.m. separator, a cargo or bilge monitor, or a bilge alarm must contain the following information:

(1) A brief description of the item submitted for approval.

(2) The name and address of the applicant and its manufacturing facility.

(3) A detailed description of quality control procedures, in-process and final inspections and tests followed in manufacturing the item, and construction and sales record keeping systems maintained.

(4) Arrangement drawings and piping diagrams of the item that give the information prescribed by § 56.01–10(d) of this chapter.

(5) Detailed electrical plans of the type described in § 111.05–5(d) of this chapter.

(6) An instructions manual containing detailed instructions on installation, operation, calibration and zeroing, and maintenance of the item.

(7) For each monitor and bilge alarm and each control on a separator, the vibration test report described in § 162.050–37.

(8) For each cargo monitor, a statement of whether it is to be used with crude oils, refined products, or both.

(9) A list of the substances used in operating the item that require certification under Part 147 of this chapter as articles of ships' stores and supplies.

(10) The name of the facility to conduct approval testing.

(11) If the applicant intends to use a test rig other than a test rig of the facility, a detailed description of the rig.

(b) An applicant may incorporate by reference in his application information that he has submitted in a previous application.

§ 162.050–7 Approval procedures.

(a) An application for approval of equipment under this subpart must be sent to the Commandant (G–MMT–3/83), U.S. Coast Guard, Washington, D.C. 20590.

(b) The application is examined by the Coast Guard to determine whether the item complies with the design requirements and vibration standard prescribed in this subpart and to determine what probability the item has of passing the approval tests. The applicant is notified of the results of the examination.

(c) If examination of the application reveals that it is incomplete, it is returned to the applicant with a statement of reasons why it is incomplete.

(d) The applicant must make arrangements for approval testing directly with a testing facility and must provide the facility with a copy of the instructions manual for the equipment to be tested.

(e) If applications for approval of a separator have been made for more than one size, the applicant, in lieu of submitting each size for approval testing, may submit each size that has a capacity exceeding fifty (50) cubic meters per hour throughput, if any, and two additional sizes that have a capacity of fifty (50) cubic meters per hour throughput or less. One of the additional sizes must have a capacity that is in the highest quartile of capacities manufactured in the 0–50 cubic meters per hour throughput range and the other must be from the lowest quartile.

(f) Each approval test must be performed by a facility designated under

§ 162.050–15. The facility must perform each test in accordance with the test conditions prescribed in this subpart for the test, prepare a test report for the item if it completes all of the tests, and send the report with four copies to the Commandant (G–MMT). The applicant may observe the tests. (If an item does not complete testing, a new application must be made before retesting.)

(g) The Commandant (G–MMT), sends a copy of the test report to the applicant and advises him whether the item is approved. If the item is approved, an approval certificate is sent to the applicant. The approval certificate lists conditions of approval applicable to the item.

(h) A separator is approved under this subpart if—

(1) It meets the design requirements in § 162.050–21 and is tested in accordance with this subpart;

(2) In the case of a 100 p.p.m. separator, the oil content of each sample of separated water effluent taken during approval testing is 100 p.p.m. or less;

(3) In the case of a 15 p.p.m. separator, the oil content of each sample of separated water effluent taken during approval testing is 15 p.p.m. or less;

(4) During Test No. 3S an oily mixture is not observed at the separated water outlet of the separator;

(5) During Test No. 5S its operation is continuous; and

(6) Any substance used in operating the separator that requires certification under Part 147 of this chapter as an article of ships' stores or supplies has been certified.

(i) A cargo monitor is approved under this subpart if—

(1) It meets the design requirements in § 162.050–25 and is tested in accordance with this subpart;

(2) Each oil content reading recorded during approval testing is within ±10 p.p.m. or ±20 percent of the oil content of the sample of influent mixture taken at the time of the reading;

(3) Its response time is twenty (20) seconds or less in Test No. 3CM;

(4) The time intervals between successive readings recorded in Test No. 4CM are twenty (20) seconds or less; and

(5) Any substance used in operating the monitor that requires certification under Part 147 of this chapter as an article of ships' stores or supplies has been certified.

(j) A bilge monitor is approved under this subpart if—

(1) It meets the design requirements in § 162.050–29 and is tested in accordance with this subpart;

(2) Except as provided in paragraph (j)(5) of this section, each oil content reading recorded during approval testing is within ±10 p.p.m. or ±20 percent of the oil content of the sample of influent mixture taken at the time of the reading;

(3) The time intervals between successive readings recorded in Test No. 3BM are twenty (20) seconds or less;

(4) The time intervals between successive readings recorded in Test No. 4BM are twenty (20) seconds or less;

(5) The oil content of the sample taken each time the device required by § 162.050–29(c)(1) actuates is 15 p.p.m. ±5 p.p.m.;

(6) The oil content of the sample taken each time the device required by § 162.050–29(c)(2) actuates is 100 p.p.m. ±20 p.p.m.; and

(7) Any substance used in operating the monitor that requires certification under Part 147 of this chapter as an article of ships' stores or supplies has been certified.

(k) A bilge alarm is approved under this subpart if—

(1) It meets the design requirements in § 162.050–33 and is tested in accordance with this subpart;

(2) The oil content of each sample taken during approval testing is 15 p.p.m. ±5 p.p.m.;

(3) Its response time is twenty seconds or less in Test No. 2A; and

(4) Any substance used in operating the alarm that requires certification under Part 147 of this chapter as an article of ships' stores or supplies has been certified.

§ 162.050–9 Test report.

(a) A report of approval testing must contain the following:

(1) Name of the testing facility.

(2) Name of the applicant.

(3) Date of receiving the item for testing and the dates of the tests conducted.

(4) Trade name and brief description of the item.

(5) A listing of the following properties of the test oils used:

(i) Relative density at 15°C.

(ii) Viscosity in centistokes at 37.8°C.

(iii) Flashpoint.

(iv) Weight of ash content.

(v) Weight of water content.

(vi) Relative density at 15°C. the of water used during testing and the weight of solid content in the water.

(vii) The data recorded during each test.

§ 162.050–11 Marking.

(a) Each separator, monitor, and bilge alarm manufactured under Coast Guard approval must be plainly marked by the manufacturer with the information listed in paragraph (b) of this section. The marking must be securely fastened to the item.

(b) Each marking must include the following information:

(1) Name of the manufacturer.

(2) Name or model number of the item.

(3) If the item is a separator, the maximum throughput and the maximum influent pressure at which the separator is designed to operate.

(4) The month and year of completion of manufacture.

(5) The manufacturer's serial number for the item.

(6) The Coast Guard approval number assigned to the item in the certificate of approval.

(7) A list of bilge cleaners, solvents, and other chemical compounds that do not impair operation of the item.

(8) If the item is a cargo monitor, the oils for which use has been approved.

(9) If the item is a separator that uses replaceable filter or coalescer elements, the part numbers of the elements.

§ 162.050–13 Factory production and inspection.

(a) Equipment manufactured under Coast Guard approval must be of the type described in the current certificate of approval issued for the equipment.

(b) Equipment manufactured under Coast Guard approval is not inspected on a regular schedule at the place of manufacture. However, the Commandant may detail Coast Guard personnel at any time to visit a factory where the equipment is manufactured to conduct an inspection of the manufacturing process.

§ 162.050–14 Sample collection and preservation.

(a) Each sample obtained in approval testing must be approximately one (1) liter in volume and must be collected in a narrow-necked glass bottle that has a pressure sealing cap. The cap must be lined with a material that will not affect the oil content of the sample.

(b) Each sample must be preserved by the addition of 5 ml. of hydrochloric acid at the time of collection. The hydrochloric acid must consist of equal amounts of concentrated reagent grade hydrochloric acid and distilled water.

(c) Each sample must be refrigerated at or below 4°C until analyzed. However, refrigeration is not necessary if there is no time delay between sample collection and analysis.

§ 162.050–15 Designation of facilities.

(a) Each request for designation as a facility authorized to perform approval tests must be submitted to the Commandant (G–MMT–3/83), U.S. Coast Guard, Washington, D.C. 20590.

(b) Each request must include the following:

(1) Name and address of the facility.

(2) Each type of equipment the facility proposes to test.

(3) A description of the facility's capability to perform approval tests including detailed information on the following:

(i) Management organization including personnel qualifications.

(ii) Equipment available for conducting sample analysis.

(iii) Materials available for approval testing.

(iv) Each of the facility's test rigs, if any.

(c) The Coast Guard reviews each request submitted to determine whether the facility meets the requirements of paragraphs (g)(1) through (g)(4) of this section.

(d) If the facility meets the requirements in paragraphs (g)(1) through (g)(4) of this section, it is then supplied with twelve samples containing mixtures of oil in water that are within a 10 to 30 p.p.m. range.

(e) The facility must measure the oil content of each sample using the method described in § 162.050–39 and report the value of each of the 12 measurements to the Commandant (G–MMT–3/83), U.S. Coast Guard, Washington, D.C. 20590.

(f) The measurements must meet the following criteria:

(1) Except as provided in paragraph (f)(2) of this section, the absolute value of Tn for each measurement, as determined by the method described in paragraph 10.3.2 of the American Society for Testing and Materials, "Standard Practice for Determination of Precision and Bias of Methods of Committee D–19 on Water", D–2777–77, must be less than or equal to 2.29 at a confidence level of 0.05.

(2) The absolute value of Tn for one measurement may exceed 2.29 if the Tn values for the other eleven measurements are less than or equal to 2.23 at a confidence level of 0.05. If the Tn value for one measurement exceeds 2.29, that measurement is not used in the method described in paragraph (f)(3) of this section.

(3) The value of $\bar{X}$ for the 12 measurements described in paragraph (e) of this section, or for 11 measurements if paragraph (f)(2) of this section applies, must be within the range of $-1\ \bar{X}d\ +1$ at a minimum confidence level of 0.01 when $\bar{X}d$ is determined by the method described in paragraph 3–3.1.4 of "Experimental Statistics", National Bureau of Standards Handbook No. 91 (October 1966).

(g) To obtain authorization to conduct approval tests—

(1) A facility must have the management organization, equipment for conducting sample analysis, and the materials necessary to perform the tests;

(2) Each facility test rig must be of a type described in § 162.050–17 or § 162.050–19;

(3) The loss or award of a specific contract to test equipment must not be a substantial factor in the facility's financial well being;

(4) The facility must be free of influence and control of the manufacturers, suppliers, and vendors of the equipment; and

(5) The oil content measurements submitted to the Commandant must meet the criteria in paragraph (f) of this section.

(h) A facility may not subcontract for approval testing unless previously authorized by the Coast Guard. A request for authorization to subcontract must be sent to the Commandant (G–MMT–3/83), U.S. Coast Guard, Washington, D.C. 20590.

§ 162.050–17 Separator test rig.

(a) This section contains requirements for test rigs used in approval testing of separators. A diagram of a typical test rig is shown in Figure 162.050–17(a).

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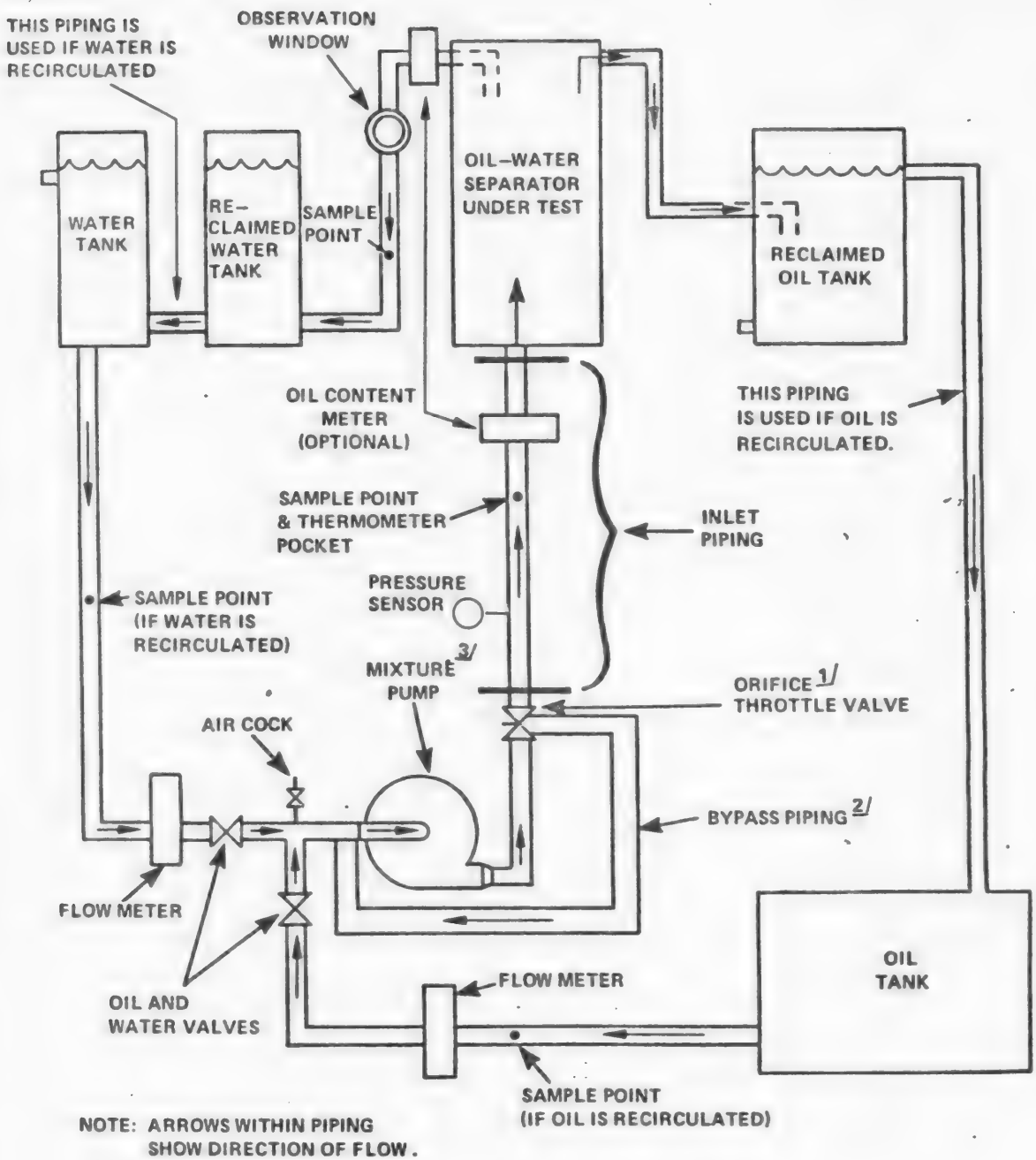
FIGURE 162,050—17(a) - SEPARATOR TEST RIG



NOTE: ARROWS WITHIN PIPING SHOW DIRECTION OF FLOW.

1/ NOT REQUIRED IF MIXTURE PUMP HAS BYPASS PIPING. SEE § 162.050–17(b) (4)

2/ NOT REQUIRED IF MIXTURE PUMP PIPING HAS ORIFICE. SEE § 162.050–17 (b)(4)

3/ NOT REQUIRED IF SEPARATOR HAS SUPPLY PUMP. SEE § 162.050–17(b)

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(b) Each mixture pump on a test rig must—

(1) Be a centrifugal pump capable of operating at one thousand (1,000) revolutions per minute or more;

(2) Have a delivery capacity of at least one and one half (1.5) times the maximum throughput at which the separator being tested is designed to operate;

(3) Have a maximum delivery pressure that is equal to or greater than the maximum influent pressure at which the separator is designed to operate; and

(4) Have either bypass piping to its suction side or a throttle valve or orifice on its discharge side.

(c) The inlet piping of the test rig must be sized so that—

(1) Influent water flows at a Reynolds Number of at least ten thousand;

(2) The influent flow rate is between one and three meters per second; and

(3) Its length is at least twenty (20) times its inside diameter.

(d) Each sample point on a test rig must meet the design requirements described in Figure 162.050–17(e) and must be in a vertical portion of the test rig piping.

§ 162.050–19 Monitor and bilge alarm test rig.

(a) This section contains requirements for test rigs used in approval testing of monitors and bilge alarms. A typical test rig is described in Figure 162.050–19. The mixture pipe shown in Figure 162.050–19 is the portion of test rig piping between the oil injection point and the monitor or bilge alarm piping.

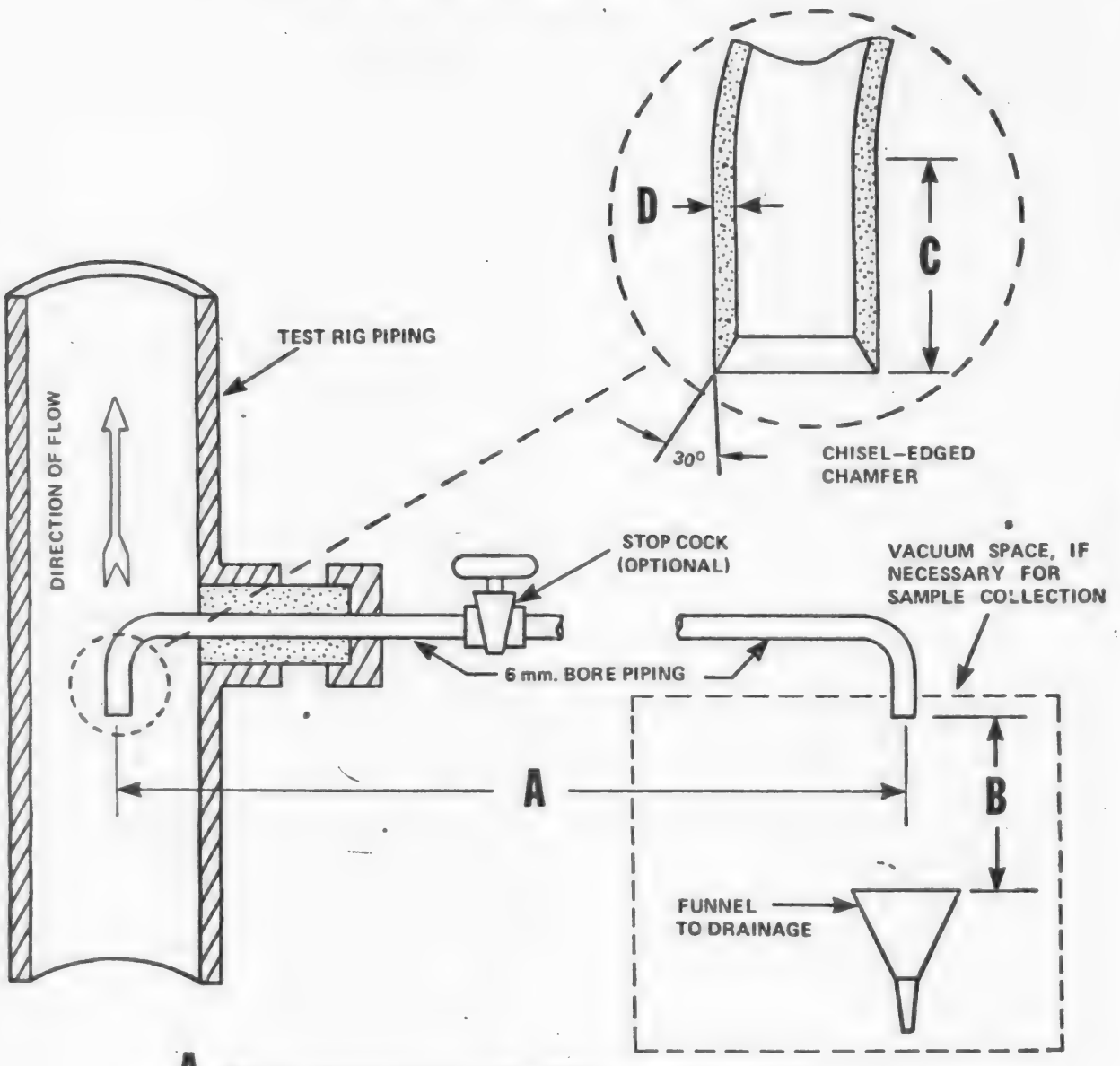
(b) Each sample point on a test rig must be of the type described in Figure 162.050–17(e) and must be in a vertical portion of the test rig piping.

(c) Each test rig must have a centrifugal pump that is designed to operate at one thousand (1,000) revolutions per minute or more.

(d) The mixture pipe on a test rig must have a uniform inside diameter.

BILLING CODE 4910–14–M

FIGURE 162,050—17(e) - SAMPLE POINT



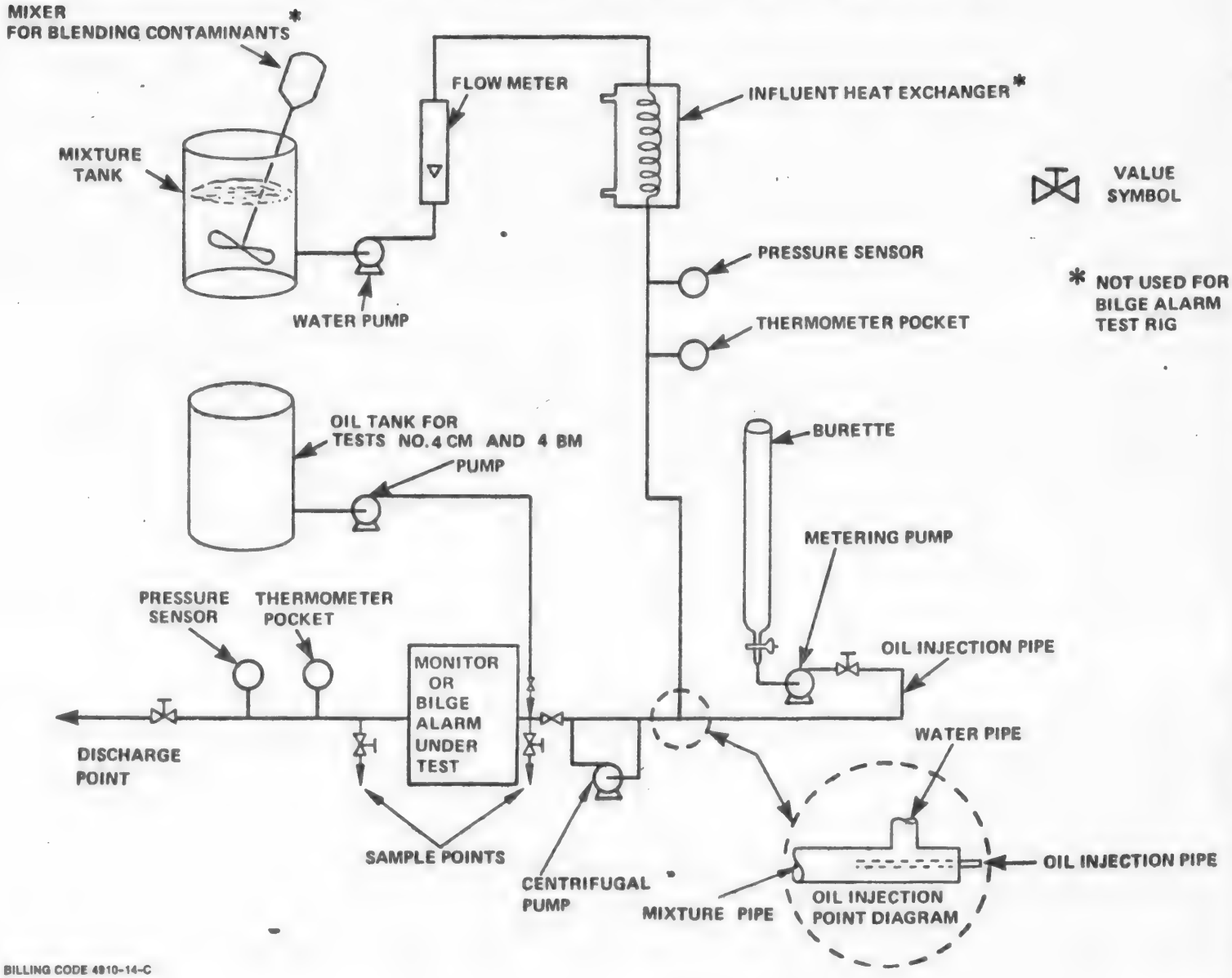
A dimension A is not greater than 400 mm.

B height B is large enough to insert a sample bottle.

C distance C is a straight line of not less than 60 mm.

D width D is not greater than 2 mm.

FIGURE 162,050—19 - MONITOR AND BILGE ALARM TEST RIG



BILLING CODE 4910-14-C

§ 162.050–21 Separator: Design specification.

(a) A separator must be designed to operate in each plane that forms an angle of 22.5° with the plane of its normal operating position.

(b) The electrical components of a separator that are to be installed in an explosive atmosphere must be approved by an independent laboratory as components that Underwriters Laboratories Standard 913 (dated April 8, 1976) defines as intrinsically safe for use in a Class I, Group D hazardous location.

(c) Each separator component that is a moving part must be designed so that its movement during operation of the separator does not cause formation of static electricity.

(d) Each separator must be designed in accordance with the applicable requirements in Subchapters F and J of this chapter.

(e) Each separator must be designed to be operated both automatically and manually. Each separator to be installed in an unattended machinery space must be capable of operating automatically for at least twenty-four (24) hours.

(f) Each separator must be designed so that adjustments to valves or other equipment are not necessary to start it.

(g) Each part of a separator that is susceptible to wear and tear must be readily accessible for maintenance in its installed position.

(h) A separator must be designed so that it does not rely in whole or in part on dilution of influent mixtures as a means of performing its function.

§ 162.050–23 Separator: Approval tests.

(a) *Test Conditions.* (1) Each test described in this section must be performed at a throughput and influent pressure equal to the maximum throughput and pressure at which the separator being tested is designed to operate. The tests and each of the steps in the tests must be carried out in the order described in this section. Each test must be performed without time delay between steps in the test.

(2) Except as provided in Test No. 6S, the influent oil used in each test must be a heavy fuel oil that has a relative density of approximately 0.94 at 15°C and a viscosity of at least 220 centistokes (approximately 900 seconds Redwood No. 1) at 37.8°C.

(3) A test rig of the type described in § 162.050–17 must be used in performing each test.

(4) If a separator has a supply pump, it must be tested using that pump. If a separator does not have a supply pump, it must be tested using the mixture pump on the test rig.

(5) The influent water used in each test must be clean fresh water or clean fresh water in solution with sodium chloride. The water or solution must have a relative density at 15°C that is equal to or less than 0.085 plus the relative density of the heavy fuel oil used in the tests.

(6) Each test must be conducted at an ambient temperature of between 10°C and 30°C.

(7) The oil content of each sample must be measured using the method described in § 162.050–39.

(8) Influent oil content must be determined during testing by measuring the flow rates of the oil and water that are mixed to form the influent or by use of an oil content meter on the inlet piping of the test rig. If an oil content meter is used, a sample of influent and a meter reading must be taken at the beginning of each test. If the meter reading is not within ±10 percent of the oil content of the sample, the meter readings subsequently taken during the test are unacceptable test results.

(9) When collecting a sample at a sample point that has a stop cock, the first minute of fluid flow through the stop cock must not be included in the sample collected.

(10) In each test, the separator must be operated in accordance with the procedures described in its instruction manual.

(11) No maintenance, including replacement of parts, may be performed on a separator during or between the tests described in this section.

(12) A one (1) liter sample of each oil to be used in testing must be taken and provided for use in the sample analysis required by § 162.050–39.

(13) The separator may not be operated manually in Test No. 5S.

(b) *Test No. 1S.* The separator is filled with water and started. It is fed with oil for at least five (5) minutes and then with an oil-water influent containing an oil content of between 5,000 and 10,000 p.p.m. until a steady flow rate occurs. After the flow rate is steady, the influent is fed to the separator for thirty (30) minutes. Samples of separated water effluent are taken after the first ten (10) and twenty (20) minutes. At the end of the thirty (30) minute period, the air cock on the test rig is opened and, if necessary, the oil and water supply valves are closed to stop the flow of influent. A sample is then taken of the separated water effluent as the effluent flow ceases.

(c) *Test No. 2S.* Test No. 1S is repeated using an influent containing approximately 25 percent oil and 75 percent water.

(d) *Test No. 3S.* The separator is fed with oil until oil is discharged at the oil discharge outlet of the separator at essentially the same rate that oil is being fed to the separator. The separator is then fed with oil for five (5) additional minutes. If any oily mixture is discharged from the separated water outlet on the separator during the test, that observation is recorded.

(e) *Test No. 4S.* The separator is fed with water for fifteen (15) minutes. Samples of the separated water effluent are taken at the beginning of the test and after the first ten (10) minutes.

(f) *Test No. 5S.* The separator is operated automatically for three (3) hours. During the test, the separator is continuously fed with an influent varying from water to a mixture of 25 percent oil in water and back to water every fifteen (15) minutes. The oil concentration in the influent is varied in at least five (5) equal increments during each fifteen (15) minute period and the time intervals between the incremental changes are equal. During the last hour, the separator must be inclined at an angle of 22.5° with the plane of its normal operating position. During the last time increment in which the unit is fed a 25 percent oil mixture, a sample of the separated water effluent is taken. If the separator stops at any time during this test, that observation is recorded.

(g) *Test No. 6S.* Tests No. 1S and No. 2S are repeated using, in lieu of a heavy fuel oil in the influent, a light distillate fuel oil having a relative density of approximately 0.83 at 15°C.

§ 162.050–25 Cargo monitor: Design specification.

(a) This section contains requirements that apply to cargo monitors.

(b) Each monitor must be designed so that it is calibrated by a means that does not involve manually mixing a known quantity of oil and a known quantity of water to form a mixture and manually feeding the mixture into the monitor.

(c) The electrical components of a monitor that are to be installed in an explosive atmosphere must be approved by an independent laboratory as components that Underwriters Laboratories Standard 913 (dated April 8, 1976) defines as intrinsically safe for use in a Class I, Group D hazardous location.

(d) Each monitor component that is a moving part must be designed so that its movement during operation of the monitor does not cause formation of static electricity.

(e) A monitor must be designed to operate in each plane that forms an

angle of 22.5° with the plane of its normal operating position.

(f) Each monitor must be designed in accordance with the applicable requirements contained in Subchapters F and J of this chapter.

(g) Each monitor must be designed so that it records each change in oil content of the mixture it is measuring within twenty (20) seconds after the change occurs.

(h) Each monitor must have a device that produces a warning signal and a signal that can be used to actuate valves in a vessel's fixed piping system, when—

(1) The oil content of the mixture being measured exceeds the concentration limit set by the operator of the monitor; and

(2) Malfunction, breakdown, or other failure of the monitor occurs.

(i) Each monitor must have a means to determine whether it is accurately calibrated.

(j) Each monitor must have a device that is designed to record continuously the amount of oil (in liters) in any cargo residue, and any other oily mixture combined with a cargo residue, discharged overboard from the vessel on which the monitor is installed. The device must also have a means to record the amount of oil in the discharge per nautical mile of vessel travel and the date and time of discharge. The record must be durable enough to be kept for three (3) years. If the device has more than one scale, it must have a means to show on the record the scale in use at the time of the reading.

§ 162.050–27 Cargo monitor: Approval tests.

(a) This section contains requirements that apply to cargo monitors.

(b) *Test conditions.* (1) The tests and each step in the tests must be carried out in the order described in this section. Each test must be performed without time delay between steps in the test.

(2) A test rig of the type described in § 162.050–19 must be used in performing each test.

(3) Each mixture used during the tests must be prepared by combining oil supplied from the oil injection pipe of the test rig and water supplied from the mixture tank of the test rig. However, if the flow of oil through the oil injection pipe becomes intermittent, oil and water may be combined in the mixture tank to form the mixture.

(4) A mixture may be circulated through a monitor only once during testing.

(5) Unless otherwise provided in a specific test, the water used in each test must be clean, fresh water.

(6) The oil used in each test, except Test No. 2CM, must be Arabian light crude oil.

(7) Each test must be performed at an ambient temperature of between 10° C and 30° C.

(8) Unless otherwise provided in a specific test, each test must be performed at the maximum mixture pressure, the maximum flow rate, and the power supply ratings at which the monitor is designed to operate.

(9) The particulate contaminant described in Table 162.050–27(g) must be of a type that does not lose more than three (3) percent of its weight after ignition and must be insoluble in a 500 p.p.m. mixture.

(10) In each test the monitor must be operated in accordance with the procedures described in its instructions manual.

(11) Unless otherwise provided in a specific test, the centrifugal pump shown in Figure 162.050–19 must be operated at one thousand (1,000) revolutions per minute or more in each test.

(12) Whenever the oil content of a mixture is recorded, a sample of the mixture must also be taken. The oil content of the sample must be measured using the method described in § 162.050–39.

(13) A one (1) liter sample of each oil to be used in testing must be taken and provided for use in the sample analysis required by § 162.050–39.

(c) *Test No. 1CM.* The cargo monitor is calibrated and zeroed. It is then fed with water for 15 minutes and then with mixtures in the following concentrations: 15 p.p.m., 50 p.p.m., 100 p.p.m., and each additional concentration, in increments of 50 p.p.m. up to the highest oil concentration that can be read on the monitor. Each mixture is fed to the monitor in the order listed for fifteen (15) minutes. Water is fed to the monitor for a (15) minute period between each mixture. At the end of each (15) minute period, an oil content reading is obtained and recorded.

(d) *Test No. 2CM.* (1) If the cargo monitor is designed for use with crude oils, it is fed with a mixture of water and the first oil listed in Table 162.050–27(d) at the following concentrations: 15 p.p.m., 100 p.p.m., and a concentration that is ninety (90) percent of the highest oil concentration in water that can be read on the monitor. Each concentration is fed to the monitor in the order listed until a steady reading occurs and is recorded. After each steady reading is recorded, the monitor is fed with water for fifteen (15) minutes. At the end of each fifteen (15) minute period of feeding the monitor with water, an oil content reading is again obtained and recorded.

(2) The steps described in paragraph (d)(1) of this section are repeating using each of the other oils listed in Table 162.050–27(d).

Table 162.050–27(d).—*Oil Type and Characteristics*

Oil type	Characteristics
1. Sahara blend crude oil	Density—low. Viscosity—low. Pour point—very low. Producing country—Algeria. General description—mixed base.
2. Arabian light crude oil	Density—medium. Viscosity—medium. Pour point—low. Producing country—Saudi Arabia. General description—mixed base.
3. Nigerian medium crude oil	Density—high. Viscosity—medium. Pour point—low. Producing country—Nigeria. General description—naphthenic base.
4. Bachaquero 17 crude oil	Density—very high. Viscosity—very high. Pour point—low. Producing country—Venezuela. General description—asphaltic base.
5. Minas crude oil	Density—medium. Viscosity—high. Pour point—very high. Producing country—Indonesia. General description—paraffinic base.
6. Residual fuel oil	Bunker C or No. 6 Fuel Oil.

(3) If any oil listed in Table 162.050–27(d) is unavailable, an oil with similar properties may be substituted in testing.

(4) If the monitor is to be used with refined oil products, the steps described in paragraph (d)(1) of this section are performed using each of the following:

(i) Leaded regular grade automotive gasoline.

(ii) Unleaded automotive gasoline.

(iii) Kerosene.

(iv) Light diesel or No. 2 fuel oil.

(e) *Test No. 3CM.* (1) The cargo monitor is fed with water, zeroed, and then fed with a 100 p.p.m. mixture. The time at which the monitor first detects oil in the mixture, the times of reading 63 p.p.m. and 90 p.p.m., and the time of reaching the highest steady reading of oil content are recorded. The oil content of the mixture at the highest steady reading is also recorded.

(2) The metering pump is turned off and the time at which the highest reading starts to decrease, the times of reading 37 p.p.m. and 10 p.p.m., and the time of returning to the lowest steady oil content reading are recorded. The oil content of the mixture at the lowest steady reading is also recorded.

(3) The time interval between first detecting oil in the mixture and reading 63 p.p.m., and the time interval between the first decrease in the highest reading and reading 37 p.p.m., are averaged and recorded as the response time for the monitor.

(f) *Test No. 4CM.* (1) The cargo monitor is fed with water, zeroed, and then fed with a mixture containing ten (10) percent oil for one (1) minute. The following times occurring during this procedure are recorded:

(i) Time at which the monitor first detects oil.

(ii) Time of reading 100 p.p.m.

(iii) Time of exceeding the highest oil concentration that can be read on the monitor.

(iv) Time of returning to the highest oil concentration that can be read on the monitor.

(v) Time of returning to a reading of 100 p.p.m.

(vi) Time of returning to the lowest steady oil content reading.

(2) The oil content of the mixture at the lowest steady reading described in paragraph (f)(1)(vi) of this section is recorded.

(3) The monitor is fed with water, zeroed, and then fed with oil for one (1) minute after which the flow of water is resumed. The times described in paragraph (f)(1) of this section are recorded.

(4) The monitor is fed with a 100 p.p.m. mixutre until a steady oil content reading is obtained and recorded.

(g) *Test No. 5CM.* (1) The cargo monitor is fed with a 500 p.p.m. mixture until a steady reading is obtained and recorded.

(2) The monitor is fed with a 500 p.p.m. mixture to which enough sodium chloride has been added to provide a concentration of 60,000 parts per million of sodium chloride in water. The oil content reading, when steady, is recorded.

(3) The monitor is fed with a 500 p.p.m. mixture to which enough of the contaminant described in Table 162.050–27(g) has been added to provide a concentration of 100 parts per million of particulate contaminant in water. The oil content reading, when steady, is recorded.

Table 162.050–27(g).—*Insoluble Particulate Contaminant; Physical Description*

Particle sizes, microns:	Percentage [1]
0–5	39±2
5–10	18±3
10–20	16±3
20–40	18±3
40–80	9±3

[1] By weight of particle size in contaminant.

(h) *Test No. 6CM.* (1) The cargo monitor is fed with a 100 p.p.m. mixture until a steady oil content reading is obtained and recorded.

(2) The monitor is fed with a 100 p.p.m. mixture that has first passed through the centrifugal pump of the test rig. The pump is run at one fourth (¼) of its design speed. The oil content reading, when steady, is recorded.

(3) The steps described in paragraph (h)(2) of this section are repeated with the pump running at one-half (½) of its design speed and then repeated at its design speed.

(i) *Test No. 7CM.* (1) The steps described in paragraph (h)(1) of this section are repeated.

(2) The temperature of the mixture is adjusted to 10°C and the flow continued until a steady oil content reading is obtained and recorded.

(3) The steps described in paragraph (i)(2) of this section are repeated with the temperature of the mixture at 65°C or the highest mixture temperature at which the cargo monitor is designed to operate, whichever is lower.

(j) *Test No. 8CM.* (1) The steps described in paragraph (h)(1) of this section are repeated.

(2) If the monitor has a positive displacement mixture pump, the mixture pressure is lowered to one half of the monitor's maximum design pressure. If the monitor has a centrifugal mixture pump, or is not equipped with a mixture pump, the mixture flow rate is reduced to one-half of the monitor's design flow rate. The reduced flow rate or mixture pressure is maintained until a steady oil content reading is obtained and recorded.

(3) If the monitor has a positive displacement mixture pump, the mixture pressure is increased to twice the monitor's design pressure. If the monitor has a centrifugal mixture pump or does not have a mixture pump, the mixture flow rate is increased to twice the monitor's maximum design flow rate. The increased flow rate or mixture pressure is maintained until a steady oil content reading is obtained and recorded.

(k) *Test No. 9CM.* (1) The steps described in paragraph (h)(1) of this section are repeated.

(2) The water and metering pumps on the test rig are stopped for eight (8) hours after which the steps described in paragraph (h)(1) of this section are repeated.

(l) *Test No. 10CM.* (1) The supply voltage to the cargo monitor is increased to one hundred and ten (110) percent of its design supply voltage. The monitor is then fed a 100 p.p.m. mixture for one (1) hour. At the end of the one (1) hour period, an oil content reading is obtained and recorded.

(2) The steps described in paragraph (l)(1) of this section are repeated with the supply voltage to the monitor lowered to ninety (90) percent of its design supply voltage.

(3) Upon completing the steps described in paragraph (l)(2) of this section, the supply voltage to the monitor is returned to the design rating.

(4) The steps described in paragraph (l)(1), (l)(2), and (l)(3) of this section are repeated varying each other power supply to the monitor in the manner prescribed in those steps for supply voltage.

(m) *Test No. 11CM.* (1) The monitor is calibrated and zeroed.

(2) The steps described in paragraph (h)(1) of this section are repeated.

(3) A 100 p.p.m. mixture is fed to the monitor for eight (8) hours. At the end of the eight (8) hour period, an oil content reading is obtained and recorded.

(4) The monitor is fed with water until a steady oil content reading is obtained and recorded.

(n) *Test No. 12CM.* (1) All power to the monitor is shut off for one (1) week. After one week the monitor is started, zeroed, and calibrated.

(2) The monitor is fed with a 100 p.p.m. mixture for one (1) hour. An oil content reading is then obtained and recorded.

(3) The monitor is fed with water for one (1) hour. An oil content reading is then obtained and recorded.

(4) The steps described in paragraphs (n)(2) and (n)(3) of this section are repeated three (3) additional times. During the last hour in which the monitor is fed with a 100 p.p.m. mixture, the monitor is inclined at an angle of 22.5° with the plane of its normal operating position.

§ 162.050–29 Bilge monitor: Design specification.

(a) This section contains requirements that apply to bilge monitors.

(b) Each bilge monitor must be designed to meet the requirements of this section and the requirements for a cargo monitor in §§ 162.050–25 (b) through (g) and § 162.050–25(i).

(c) Each bilge monitor must have—

(1) A device that produces a warning signal, and a signal that can be used to actuate stop valves in a vessel's fixed piping system, when the oil content of the mixture being measured exceeds 15 p.p.m. ±5 p.p.m.;

(2) A device that produces a warning signal, and a signal that can be used to actuate stop valves in a vessel's fixed piping system, when the oil content of the mixture being measured exceeds 100 p.p.m. ±20 p.p.m.; and

(3) A device that produces a warning signal, and a signal that can be used to actuate stop valves in a vessel's fixed piping system, when malfunction, breakdown, or other failure of the bilge monitor occurs.

(d) Each bilge monitor must have a device that is designed to record continuously the concentration of oil in p.p.m. that the monitor measures and to record the date and time of the measurements. The record must be durable enough to be kept for three (3) years. If the device has more than one scale, it must have a means to show on the record the scale in use at the time of the reading.

§ 162.050–31 Bilge monitor: Approval tests.

(a) This section contains requirements that apply to bilge monitors.

(b) *Test conditions.* (1) Each test must be conducted under the conditions prescribed in this section and under the conditions prescribed for cargo monitors in §§ 162.050–27 (b)(1) through (b)(4) and §§ 162.050–27 (b)(7) through (b)(13).

(2) Except as provided in Test No. 2BM, the oil used in each test must be a heavy fuel oil that has a relative density of approximately 0.94 at 15°C and a viscosity of at least 220 centistokes (approximately 900 seconds Redwood No. 1) at 37.8°C.

(3) The water used in each test must be clean fresh water or clean fresh water in solution with sodium chloride. The water must have a relative density at 15°C that is equal to or less than 0.085 plus the relative density of the heavy fuel oil used in the tests.

(c) *Test No. 1BM.* (1) The bilge monitor is calibrated and zeroed. It is then fed with water for 15 minutes and then with mixtures in the following concentrations: 15 p.p.m., 50 p.p.m., 75 p.p.m., 100 p.p.m., and each additional concentration, in increments of 25 p.p.m. up to the highest oil concentration that can be read on the monitor. Each concentration is fed to the monitor in the order listed for fifteen (15) minutes. Water is fed to the monitor for fifteen (15) minutes between each mixture. At the end of each fifteen (15) minute period an oil content reading is obtained and recorded.

(2) The metering and water pumps of the test rig are started and the oil content of the mixture is increased until the device required by § 162.050–29(c)(1) actuates. The oil content of the mixture causing actuation is recorded.

(3) The oil content of the mixture is then increased until the device required by § 162.050–29(c)(2) actuates. The oil content of the mixture causing actuation is recorded.

(d) *Test No. 2BM.* Test No. 1BM is repeated using, in lieu of a heavy fuel oil in the mixture, a light distillate fuel oil having a relative density of approximately 0.83 at 15°C.

(e) *Test No. 3BM.* (1) The bilge monitor is fed with water, zeroed, and then fed with a 15 p.p.m. mixture until a steady reading is obtained and recorded. The time of first detecting oil in the mixture and the time of reaching the highest steady reading of oil content are also recorded. The metering pump is turned off after the highest steady reading is obtained. The time at which the highest steady reading starts to decrease and the time of returning to the lowest steady oil content reading are recorded. The oil content of the lowest steady reading is also recorded.

(2) The steps in paragraph (1) of this section are repeated using a 100 p.p.m. mixture.

(f) *Test No. 4BM.* (1) The bilge monitor is fed with water, zeroed, and then fed with a mixture containing (10) percent oil for one (1) minute. The following times occurring during this procedure are recorded:

(i) Time at which the monitor first detects oil.

(ii) Time of actuation of the device required by § 162.050–29(c)(1).

(iii) Time of actuation of the device required by § 162.050–29(c)(2).

(iv) Time of exceeding the highest oil concentration that can be read on the monitor.

(v) Time of returning to the highest oil concentration that can be read on the monitor.

(vi) Time of returning to the lowest steady oil content reading.

(2) The oil content of the mixture at the lowest steady reading described in paragraph (f)(1)(vi) of this section is recorded.

(3) The monitor is fed with water, zeroed, and then fed with oil for one (1) minute after which the flow of water is resumed. The times described in paragraph (f)(1) of this section are recorded.

(4) The monitor is fed with a 15 p.p.m. mixture until a steady oil content reading is obtained and recorded.

(5) The monitor is fed with a 100 p.p.m. mixture until a steady oil content reading is obtained and recorded.

(g) *Test No. 5BM.* (1) The bilge monitor is fed with an 80 p.p.m. mixture until a steady reading is obtained and recorded.

(2) The monitor is fed with an 80 p.p.m. mixture to which enough sodium chloride has been added to provide a concentration of 60,000 parts per million of sodium chloride in water. The oil content reading, when steady, is recorded.

(3) The monitor is fed with an 80 p.p.m. mixture to which enough of the contaminant described in Table 162.050–27(g) has been added to provide a concentration of 20 parts per million of particulate contaiminant in water. The oil content reading, when steady, is recorded.

(h) *Test No. 6BM.* (1) The bilge monitor is fed with a 5–10 p.p.m. mixture until a steady reading is obtained and recorded.

(2) If the monitor has a positive displacement mixture pump, the mixture pressure is lowered to one half of the monitor's maximum design pressure. If the monitor has a centrifugal mixture pump or is not equipped with a mixture pump, the mixture flow rate is reduced to one half of the monitor's maximum design flow rate. After reduction of the pressure or flow rate, the oil content of the mixture is increased until the device required by § 162.050–29(c)(1) actuates. The oil content causing actuation is recorded.

(3) The monitor is fed with an 80 p.p.m. mixture until a steady reading is obtained and recorded. The oil content of the mixture is then increased until the device required by § 162.050–29(c)(2) actuates. The oil content causing actuation is recorded.

(4) If the monitor has a positive displacement mixture pump, the mixture pressure is increased to twice the monitor's maximum design pressure. If the monitor has a centrifugal mixture pump or if the monitor is not equipped with a mixture pump, the mixture flow rate is increased to twice the monitor's maximum design flow rate. After increasing the pressure or flow rate, the oil content of the mixture is increased until the device required by § 162.050–29(c)(1) actuates. The oil content causing actuation is recorded.

(5) The steps described in paragraph (h)(3) of this section are repeated.

(i) *Test No. 7BM.* (1) The steps described in paragraphs (c)(2) and (c)(3) of this section are repeated.

(2) The water and metering pumps on the test rig are stopped for eight (8) hours after which the steps described in paragraphs (c)(2) and (c)(3) of this section are repeated.

(j) *Test No. 8BM.* (1) The supply voltage to the bilge monitor is increased to one hundred and ten (110) percent of its design supply voltage. The monitor is then fed a 10 p.p.m. mixture for one (1) hour. At the end of the one (1) hour period, the oil content reading is recorded.

(2) The oil content of the mixture is increased until the device required by

§ 162.050–29(c)(1) actuates. The oil content causing actuation is recorded.

(3) The bilge monitor is fed with an 80 p.p.m. mixture for one (1) hour. At the end of the one (1) hour period, an oil content reading is obtained and recorded.

(4) The oil content of the mixture is increased until the device required by § 162.050–29(c)(2) actuates. The oil content causing actuation is recorded.

(5) The steps described in paragraphs (j)(1) through (j)(4) of this section are repeated with the supply voltage to the bilge monitor lowered to ninety (90) percent of its design voltage.

(6) Upon completing the steps described in paragraph (j)(5) of this section, the supply voltage to the monitor is returned to the design rating.

(7) The steps described in paragraphs (j)(1) through (j)(4) of this section are repeated varying each other power supply to the monitor in the manner prescribed in those steps for supply voltage.

(k) *Test No. 9BM.* (1) The steps described in paragraphs (c)(2) and (c)(3) of this section are repeated.

(2) An 80 p.p.m. mixture is fed to the bilge monitor for eight (8) hours. At the end of the eight (8) hour period, an oil content reading is obtained and recorded.

(3) The steps described in paragraphs (c)(2) and (c)(3) of this section are repeated.

(4) The monitor is fed with water until a steady reading is obtained and recorded.

(l) *Test No. 10BM.* (1) All power to the bilge monitor is shut off for one (1) week. After one week the monitor is started, zeroed, and calibrated.

(2) The monitor is fed with an 80 p.p.m. mixture for one (1) hour. An oil content reading is then obtained and recorded.

(3) The steps described in paragraphs (c)(2) and (c)(3) of this section are repeated.

(4) The monitor is fed with water for one (1) hour. An oil content reading is then obtained and recorded.

(5) The steps described in paragraphs (1)(2), (1)(3), and (1)(4) of this section are repeated three (3) additional times. During the last time that the step described in paragraph (1)(2) of this section is repeated, the monitor is inclined at an angle of 22.5° with the plane of its normal operating position.

§ 162.050–33 Bilge alarm: Design specification.

(a) This section contains requirements that apply to bilge alarms.

(b) Each bilge alarm must be designed to meet the requirements for a cargo monitor in §§ 162.050–25(b) through (g), § 162.050–25(i), and the requirements in this section.

(c) Each bilge alarm must have a device that produces a warning signal, and a signal that can be used to actuate stop valves in a vessel's fixed piping system, when—

(1) the oil content of the mixture being measured by the bilge alarm exceeds 15 p.p.m. ±5 p.p.m., and

(2) malfunction, breakdown, or other failure of the bilge alarm occurs.

§ 162.050–35 Bilge alarm: Approval tests.

(a) This section contains requirements that apply to bilge alarms.

(b) *Test Conditions.* (1) Each test must be conducted under the conditions prescribed for cargo monitors in §§ 162.050–27 (b)(1) through (b)(5), §§ 162.050–27 (b)(7), (b)(8), (b)(10), (b)(11), and (b)(13).

(2) Each test must be performed using a light distillate fuel oil having a relative density of approximately 0.83 at 15°C.

(3) The oil content of each sample must be measured using the method described in § 162.050–39.

(c) *Test No. 1A.* The bilge alarm is calibrated and zeroed. The metering and water pumps of the test rig are started and the oil content of the mixture is increased until the alarm actuates. A sample of the mixture causing actuation of the alarm is taken. The alarm is then fed with water for fifteen (15) minutes.

(d) *Test No. 2A.* (1) The bilge alarm is fed with a 40 p.p.m mixture until the bilge alarm actuates. The time of turning on the metering pump of the test rig and the time of alarm actuation are recorded. The flow rate on the flow meter of the test rig is also recorded.

(2) The response time of the alarm is calculated as follows:

$$\text{response time} = T_2 - \left[T_1 + \frac{(\pi)\ (D^2)\ (L)}{4Q}\right]$$

T_2 = time of alarm actuation
T_1 = time of turning on the metering pump of the test rig
D = inside diameter of the mixture pipe (cm)
L = length of the mixture pipe (cm)
Q = flow rate (cm^3/sec)

(e) *Test No. 3A.* (1) The metering and water pumps of the test rig are started and the oil content of the mixture is increased until the bilge alarm actuates. A sample of the mixture causing actuation of the alarm is taken.

(2) If the alarm has a positive displacement mixture pump, the mixture pressure is reduced to one-half (½) of the alarm's maximum design pressure. If the alarm has a centrifugal mixture pump or is not equipped with a mixture pump, the mixture flow rate is reduced to one-half (½) of the alarm's maximum design flow rate. After reduction of pressure or flow rate, the oil content in the mixture is increased until the alarm actuates. A sample of the mixture causing actuation of the alarm is taken.

(3) If the alarm has a positive displacement mixture pump, the influent pressure is increased to twice the alarm's minimum design pressure. If the alarm has a centrifugal mixture pump or if the alarm is not equipped with a mixture pump, the influent flow rate is increased to twice the alarm's maximum design flow rate. After increasing the pressure or flow rate, the oil content in the mixture is increased until the alarm actuates. A sample of the mixture causing actuation is taken.

(f) *Test No. 4A.* (1) The steps described in paragraph (e)(1) of this section are repeated.

(2) The metering and water pumps of the test rig are stopped for eight (8) hours.

(3) The metering and water pumps are started and the oil content of the mixture is increased until the bilge alarm actuates. A sample of the mixture causing actuation is taken.

(g) *Test No. 5A.* (1) The supply voltage to the bilge alarm is raised to one-hundred ten (110) percent of its design supply voltage. The oil content of the mixture is then increased until the alarm actuates. A sample of the mixture causing actuation is taken.

(2) The supply voltage to the alarm is lowered to ninety (90) percent of its design suppy voltage. The oil content of the mixture is then increased until the alarm actuates. A sample of the mixture causing actuation is taken.

(3) Upon completion of the steps described in paragraph (g)(2) of this section, the supply voltage to the alarm is returned to its design value.

(4) The steps described in paragraphs (g)(1), (g)(2), and (g)(3) of this section are repeated varying each other power supply to the alarm in the manner prescribed in those steps for supply voltage.

(h) *Test No. 6A.* (1) The steps described in paragraph (e)(1) of this section are repeated.

(2) The bilge alarm is fed with a 5 to 10 p.p.m. mixture for eight (8) hours. After eight (8) hours the oil content of the mixture is then increased until the alarm actuates. A sample of the mixture causing actuation is taken.

(i) *Test No. 7A.* (1) All power to the bilge alarm is shut off for one (1) week.

After one (1) week the alarm is then started, zeroed, and calibrated.

(2) The steps described in paragraph (e)(1) of this section are repeated. Water is then fed to the monitor for one (1) hour.

(3) The steps described in paragraph (i)(2) are repeated seven (7) additional times. During the last hour, the alarm must be inclined at an angle of 22.5° with the plane of its normal operating position.

§ 162.050-37 Vibration test.

(a) Equipment submitted for Coast Guard approval must first be tested under the conditions prescribed in paragraph (b) of this section. The test must be performed at an independent laboratory that has the equipment to subject the item under test to the vibrating frequencies and amplitudes prescribed in paragraph (b) of this section. The test report submitted with the application for Coast Guard approval must be prepared by the laboratory and must contain the test results.

(b) Each monitor and bilge alarm and each control of a separator must be subjected to continuous sinusoidal vibration in each of the following directions for a 4 hour period in each direction:

(1) Vertically up and down.

(2) Horizontally from side to side.

(3) Horizontally from end to end.

The vibrating frequency must be 80Hz, except that the vibrating frequency of equipment that has a resonant frequency between 2Hz and 80Hz must be the resonant frequency. If the vibrating frequency is between 2Hz and 13.2Hz, the displacement amplitude must be ± 1mm. If the vibrating frequency is between 13.2Hz and 80 Hz, the acceleration amplitude must be ± [(.7)(gravity)].

§ 162.050-39 Measurement of oil content.

(a) *Scope.* This section describes the method and apparatus to be used in measuring the oil content of a sample taken in approval testing of each separator, monitor, or alarm. Light oil fractions in the sample, with the exception of volatile components lost during extractions, are included in each measurement.

(b) *Summary of method.* Each sample is acidified to a low pH and extracted with two volumes of solvent. The oil content of the sample is determined by comparison of the infrared absorbance of the sample extract against the absorbance of known concentrations of a reference oil in solvent.

(c) *Apparatus.* The following apparatus is used in each measurement:

(1) Separatory funnel that is 1000 ml. or more in volume and that has a Teflon stopcock.

(2) Infrared spectrophotometer.

(3) A cell of 5 mm. pathlength that has sodium chloride or infrared grade quartz with a minimum of 80 percent transmittance at 2930 cm^{-1}. (This cell should be used if the oil content of the sample to be measured is expected to have a concentration of between 2 p.p.m. and 80 p.p.m.)

(4) A cell of pathlength longer than 5 mm. that has sodium chloride or infrared grade quartz with a minimum of 80 percent transmittance at 2930 cm^{-1}. (This cell should be used if the oil content of the sample to be measured is expected to have a concentration of between 0.1 p.p.m. and 2 p.p.m.)

(5) Medium grade filter paper.

(6) 100 ml. glass stoppered volumetric flasks.

(d) *Reagents.* The following regaents are used in each measurement:

(1) Hydrochloric acid prepared by mixing equal amounts of concentrated, reagent grade hydrochloric acid and distilled water.

(2) Reagent grade sodium chloride.

(3) One of the following solvents:

(i) Spectrographic grade carbon tetrachloride.

(ii) Reagent grade Freon 113, except that this solvent may not be used to analyze samples in approval testing of cargo monitors. (Ucon 113, Genatron 113, or an equivalent fluorocarbon solvent are also acceptable.)

(4) Reference oil, which is the oil used in the portion of the test during which the sample is collected.

(5) Stock reference standard prepared by weighing 0.30 g. of reference oil in a tared 100 ml. volumetric flask and diluting to 100 ml. volume with solvent.

(e) *Preparation of calibration standards.* A series of dilutions is prepared by pipetting volumes of stock reference standard into 100 ml. volumetric flasks and diluting to volume with solvent. A convenient series of volumes of the stock reference standard is 5, 10, 15, 20, and 25 ml. The exact concentrations of the dilutions in milligrams of oil per 100 milliliters of diluted stock reference standard are calculated. The calibration standards are the dilutions.

(f) *Extraction.* (1) A reagent blank is carried through each step described in this paragraph and paragraph (g) of this section.

(2) The pH of each sample is checked by dipping a glass rod into the sample and touching the rod with pH-sensitive paper to ensure that the pH is 2 or lower. More acid is added if necessary until the pH is 2 or lower. The glass rod is then rinsed in the sample bottle with solvent.

(3) The sample is poured into a separatory funnel and 5 g. of sodium chloride are added.

(4) Fifty (50) ml. of solvent are added to the sample bottle. The bottle is capped tightly and shaken thoroughly to rinse its inside. The contents of the bottle are then transferred to the separatory funnel containing the sample and extracted by shaking vigorously for 2 minutes. The layers are allowed to separate.

(5) The solvent layer is drained through a funnel containing solvent moistened filter paper into a 100 ml. volumetric flask.

(6) Fifty (50) ml. of solvent are added to the sample bottle. The bottle is capped tightly and shaken thoroughly to rinse its inside surface. The contents of the bottle are then transferred to the separatory funnel containing the water layer of the sample. The contents of the separatory funnel are then extracted by shaking vigorously for 2 minutes. The layers are allowed to separate. The solvent layer is then drained through a funnel containing solvent moistened filter paper into the volumetric flask containing the solvent layer of the sample.

(7) The tips of the separatory funnel, filter paper, and funnel are rinsed with small portions of solvent and the rinsings are collected in the volumetric flask containing the solvent layer of the sample. The volume is adjusted with solvent up to 100 ml. The flask is then stoppered and its contents are thoroughly mixed.

(8) The water layer remaining in the separatory funnel is drained into a 1000 ml. graduated cylinder and the water volume estimated to the nearest 5 ml.

(g) *Infrared spectroscopy.* (1) The infrared spectrophotometer is prepared according to manufacturer instructions.

(2) A cell is rinsed with two volumes of the solvent layer contained in the volumetric flask. The cell is then completely filled with the solvent layer. A matched cell containing solvent is placed in the reference beam.

(3) If a scanning spectrophotometer is used, the solvent layer in the cell and the calibration standards are scanned from 3200 cm^{-1} to 2700 cm^{-1}. If a single beam or non-scanning spectrophotometer is used, the manufacturer's instructions are followed and the absorbance is measured at or near 2930 cm^{-1}.

(4) If the scan is recorded on absorbance paper, a straight baseline of the type described in Figure 162.050-39(g) is constructed. To obtain the net absorbance, the absorbance of the

baseline at 2930 cm^{-1} is subtracted from the absorbance of the maximum peak on the curve at 2930 cm^{-1}.

(5) If the scan is recorded on transmittance paper, a straight baseline is constructed on the hydrocarbon band plotted on the paper. The net absorbance is:

$$\log_{10} \frac{\%T \text{ (baseline)}}{\%T \text{ (peak maximum)}}$$

(6) A plot is prepared for net absorbance vs. oil content of the calibration standards or of the percentages of stock reference standard contained in the calibration standards.

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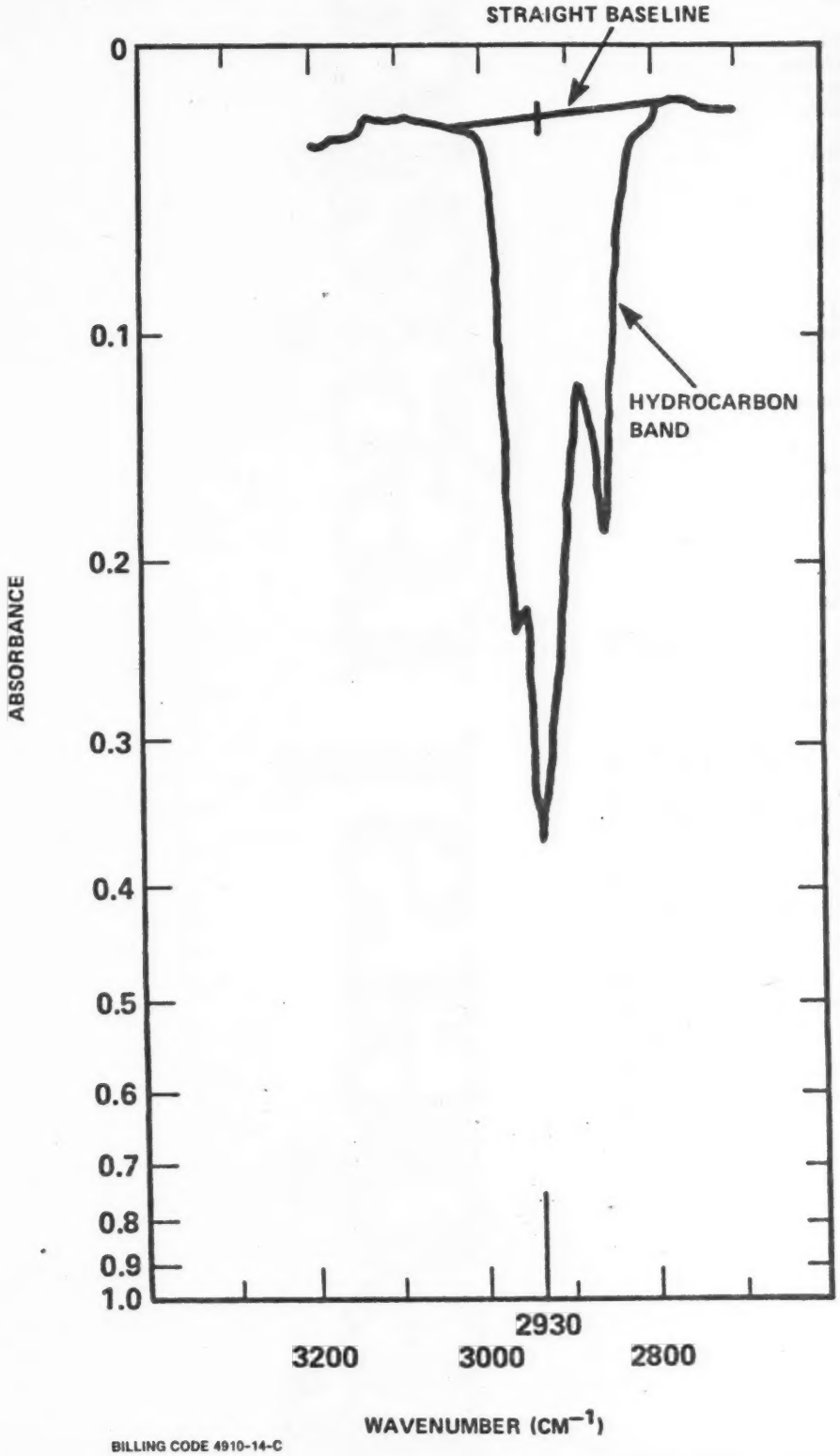
FIGURE 162,050—39(g) - SPECTRUM ILLUSTRATING BASELINE CONSTRUCTION



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(7) If the net absorbance of a sample determined by the calibration plot exceeds 0.8 or the linear range of the spectrophotometer, a dilution of the solvent layer contained in the volumetric flask after completing the step described in paragraph (f)(7) of this section is prepared by the pipetting an appropriate volume of the solvent layer into a second volumetric flask and diluting to volume with solvent. If the net absorbance is less than 0.1 when determined in accordance with the procedures in this paragraph, it is recalculated using a longer pathlength cell.

(h) *Calculations.*

(1) The plot described in paragraph (g)(6) of this section is used to determine the milligrams of oil in each 100 ml. of solvent layer contained in the volumetric flask after completing the steps described in paragraph (f) or paragraph (g)(7) of this section.

(2) The oil content of the sample is calculated using the following formula:

oil content of sample = $R \times D \times 1000/V$

R = mg. of oil in 100 ml. of solvent layer determined from plot.

D = 1 or, if the step described in paragraph (g)(7) of this section is performed, the ratio of the volume of the second volumetric flask described in that paragraph to the volume of solvent layer pipetted into the second volumetric flask.

V = The volume of water in milliliters drained into the graduated cylinder at the step described in paragraph (f)(8) of this section.

(3) The results are reported to two significant figures for oil contents below 100 mg/l and to three significant figures for oil contents above 100 mg/l. The results are converted to p.p.m.

(33 U.S.C. 1321(j); 46 U.S.C. 391a; 49 U.S.C. 1655(b)(1); and 49 CFR 1.46).

Incorporation by reference provisions approved by the Acting Director of the Federal Register August 21, 1979.

Dated August 30, 1979.

J. B. Hayes,

Admiral, U.S. Coast Guard Commandant

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